[redacted]

IR NO. 68-20

INFORMAL REPORT

OCEANOGRAPHIC DATA REPORT SAN CLEMENTE ISLAND AREA JULY AND AUGUST 1967

MARCH 1968

NAVAL OCEANOGRAPHIC OFFICE
WASHINGTON, D. C. 20390

INFORMAL REPORT

The Informal Report (IR) as produced at the Naval Oceanographic Office is a means for personnel to issue timely scientific and technical preliminary reports of their investigations. These are primarily informal documents used to report preliminary findings or useful byproducts of investigations and work to members of the scientific and industrial communities.

Informal Reports are assigned sequential numbers for each calendar year; the digits preceding the dash indicate the year.

The distribution made of this report is determined primarily by the author. Information concerning obtaining additional copies or being placed on a distribution list for all future Informal Reports in a given area of interest or specialty field, should be obtained from.

Distribution Control Department
Code 4420
Naval Oceanographic Office
Washington, D. C. 20390

ABSTRACT

This report presents oceanographic data collected during July and August 1967 aboard the USNS DAVIS (T-AGOR 5) in the San Clemente Island Deep Submergence Rescue Vehicles Test Range and SEA LAB III areas. The Deep-Towed Profiler records show two small valleys in the SEA LAB III area. The bottom's surface was predominately sand at the sites sampled. Nansen cast data show that the water column temperature decreases almost linearly below the thermocline. Although current speeds of 0.5 knots were recorded at the 100 and 260 fathom sites, the predominant current speeds varied from 0.0 to 0.2 knots. The near-bottom current at the 42 fathom site reached 0.7 knots with a mean speed of 0.5 knots. The current direction at the sites sampled reverses along an axis parallel to San Clemente Island. Bottom photographs show that the bottom is alternately smooth and flat, steep, and boulder strewn.

A.R. MOONEY
ROBERT K. OSER
Developmental Surveys Division
Oceanographic Surveys Department

This Manuscript has been reviewed and is approved for release as an UNCLASSIFIED Informal Report.

Bernard C. Byrnes

BERNARD C. BYRNES
Director
Developmental Surveys Division

TABLE OF CONTENTS

FIGURES

TABLE OF CONTENTS
(CONTINUED)

INTRODUCTION

General

During July and August 1967, the Bottom Environmental Survey Project (BESP) of the Naval Oceanographic Office (NAVOCEANO) conducted an oceanographic environmental survey in the vicinity of San Clemente Island (SCI), California. This information is intended to supplement the data obtained during the October to December 1966 survey in the same area (1). The purpose of these studies was to obtain oceanographic information for the support of the Deep Submergence Systems Project (DSSP).

Mr. A. R. Mooney was the NAVOCEANO Project Leader, and was assisted by Messrs. R. Thomas, J. Coleman, L. Freeman, W. Graves, and S. Dory during the July survey and by Messrs. R. Oser, R. Thomas, M. Fagot and L. Freeman during the August survey.

Operations

The survey was conducted aboard USNS CHARLES H. DAVIS (T-AGOR 5) from 5-8 July and 19-23 August. In addition, a Navy Torpedo Recovery Boat (TRB-7) from the Long Beach Naval Station and a Patrol boat from the Naval Undersea Warfare Center Facility, San Clemente Island were used on 18 August to recover current meter arrays. Observations were made in the Deep Submergence Rescue Vehicle (DSRV) Test Range and in the SEA LAB III area adjacent the northeast side of San Clemente Island (Figure 1). The observations made were as follows:

- 4 Bottom samples
- 5 Nansen casts
- 26 Miles (approximately) of Deep Towed Profiler (DTP) track
- 80 Miles (approximately) of bathymetry track
- 1 Bottom Environmental Sensing System (BESS) launch and retrieve
- 3 Current meter array plants
- 5 Miles (approximately) of towed camera bottom photographs

Data

Original records of all data are retained by NAVOCEANO.

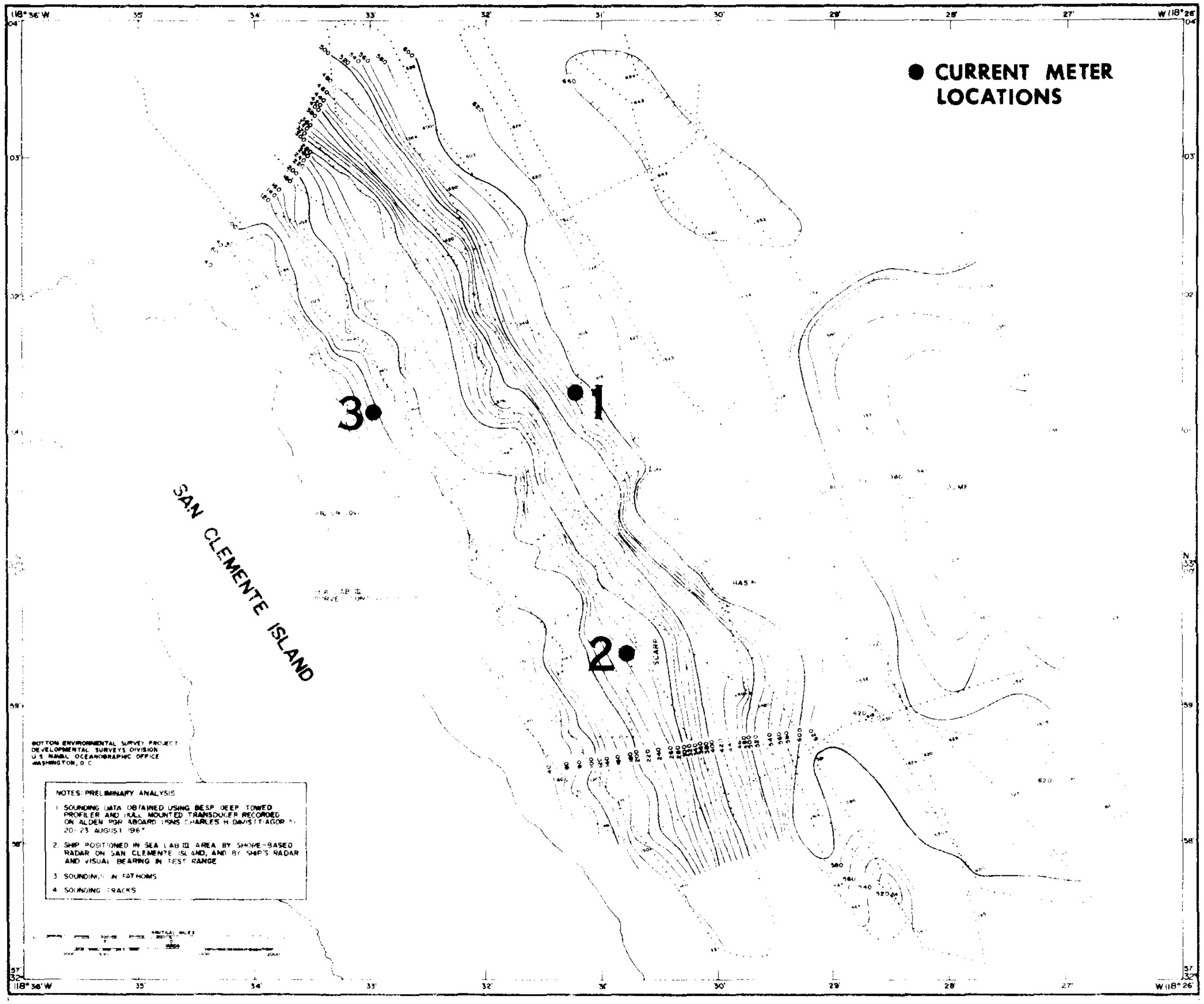


FIGURE 1 TEST RANGE BATHYMETRY AND CURRENT METER ARRAY SITES

II. BATHYMETRY

General

A deep-towed, high-resolution profiler was used in the SEA LAB III and DSRV Test Range areas during the survey. The objective of this system was to tow the sonic source near the bottom in order to reduce the ground coverage thereby increasing the bathymetric detail of the records. Secondly, high resolution, shallow subbottom profiling could be achieved since the water column attenuation was reduced (2).

Methods and Procedures

Two 12KC EDO Model 465 transducers were mounted back to back in an Ocean Research Equipment's Towed Transducer Vehicle. These transducers were synchronized and keyed by the shipboard Alden 419 Precision Graphic Recorder (PGR) through a 2H1 low center resistance (4.38 ohms/1000') conductor cable. Every 1/4 second the transducers were keyed to emit a 12KC signal upward toward the air-sea interface and downward toward the sea-bottom interface. The reflected returns were received at the transducers, amplified, and transmitted to the ship through the conductor tow cable. These signals were displayed on the recorder as fish to surface and fish to bottom distances. In the SEA LAB III area, the fish distance behind the ship was determined using the ship's hull transducers as passive hydrophones to determine the slant range from fish to ship (Figure 2). The horizontal distance was computed from this information. During the SEA LAB III survey, the ship was navigated by Randall Radar on San Clemente Island. In the DSRV Test Range bathymetric survey, the deep towed profiler was towed in the shallow portion and the standard 12KC hull-mounted transducer was used in the remainder of the Range. During this time the ship was navigated by visual bearings but periods of fog rendered some of the fixes questionable.

Analysis and Results

A bottom contour chart of the DSRV Test Range is presented in Figure 1. The steep San Clemente Escarpment, a section of the Santa Catalina Basin, and a flank of the dome are shown. Figure 3 is a contour chart of the SEA LAB III area showing sounding and cross-section lines. The cross-sections are presented in Figure 4. Section A-B shows the rapid slope increase at the 55 fathom line. PGR presentations of SEA LAB grid lines #2, #4, #6, and #10 are shown in Figures 5 to 8. Line #4 shows one of the valleys and lines #6 and #10 show both the valleys present in the area.

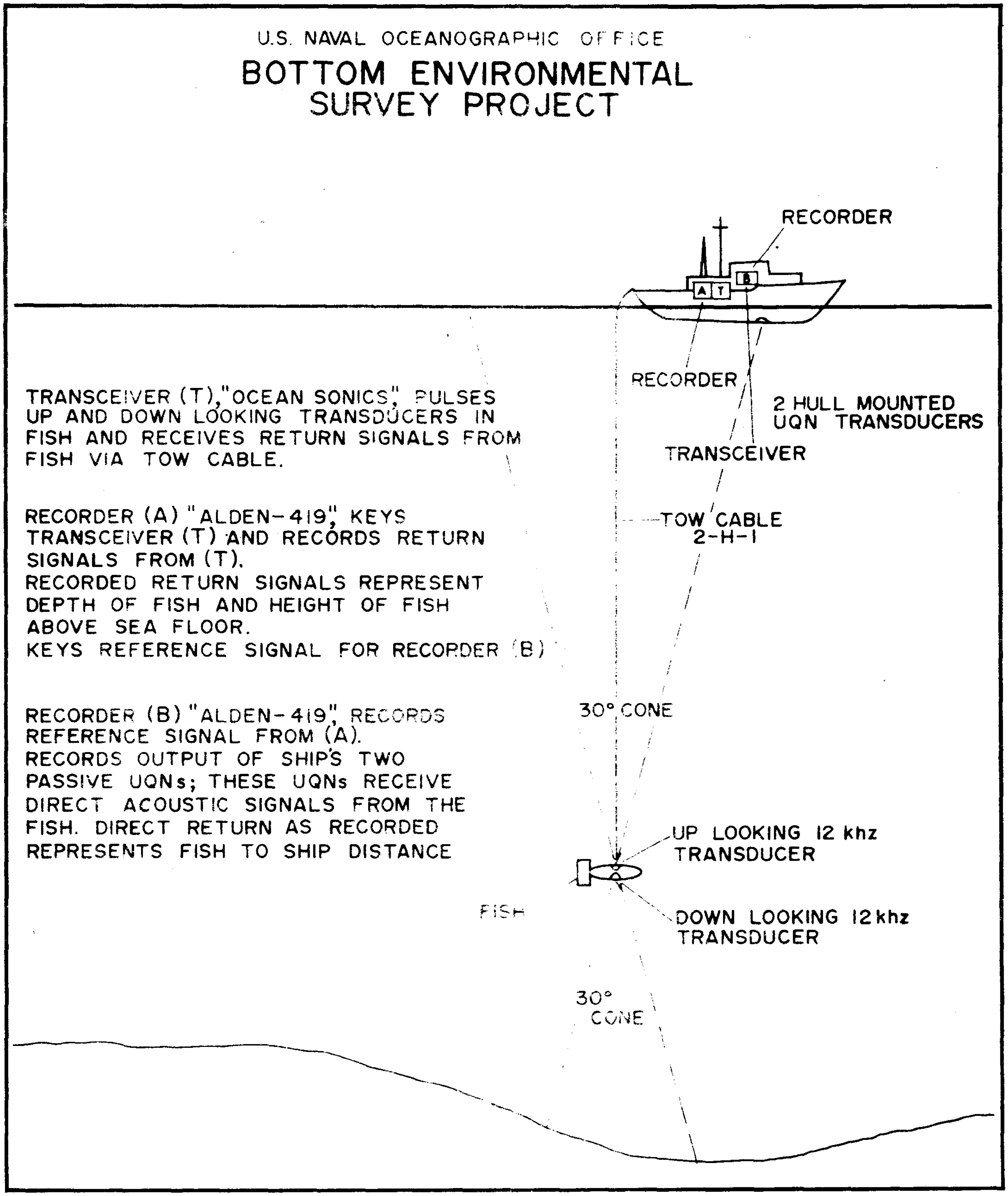


FIGURE 2 DEEP-TOWED PROFILER SYSTEM

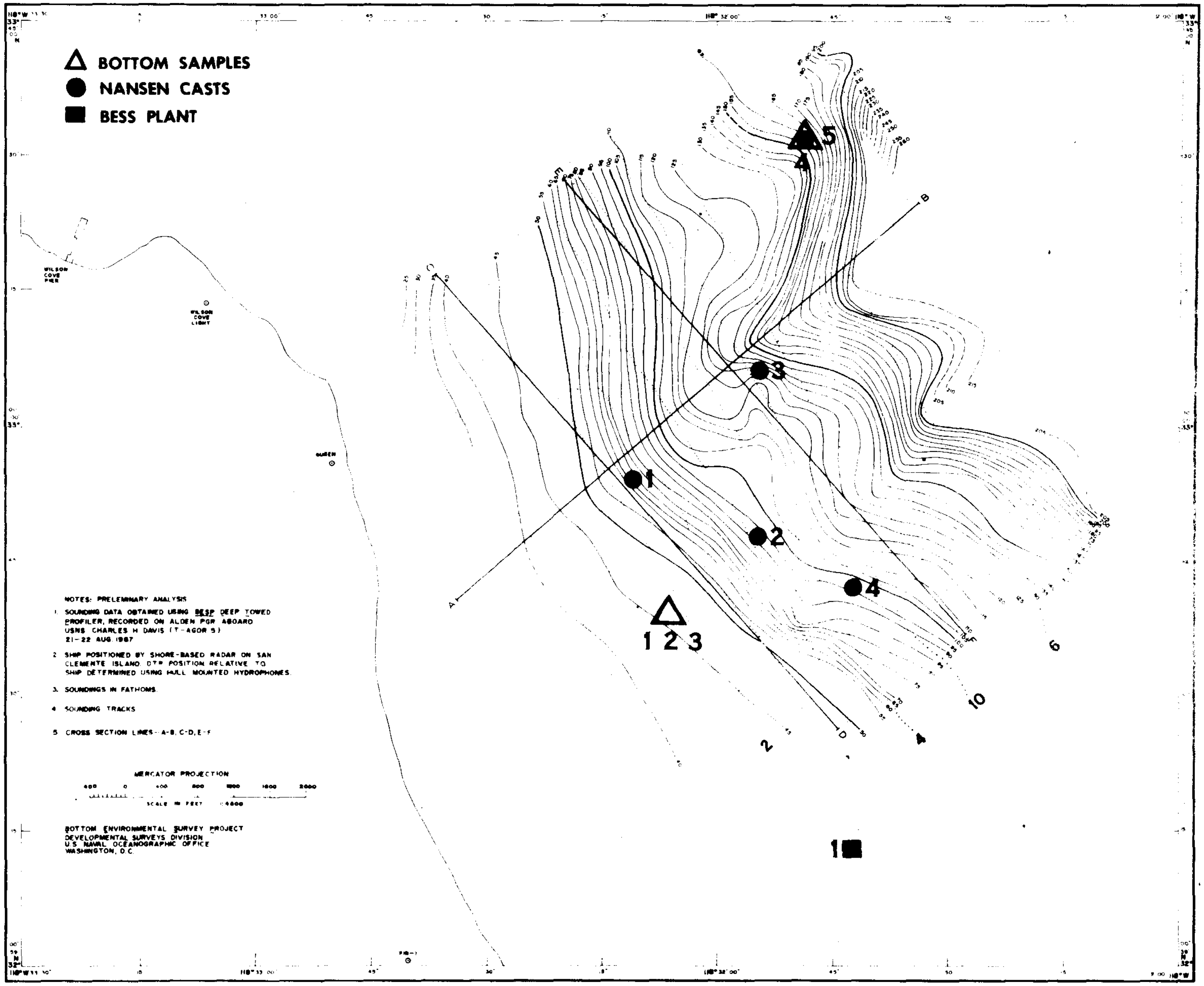


FIGURE 3 SEA LAB III SITE BOTTOM TOPOGRAPHY

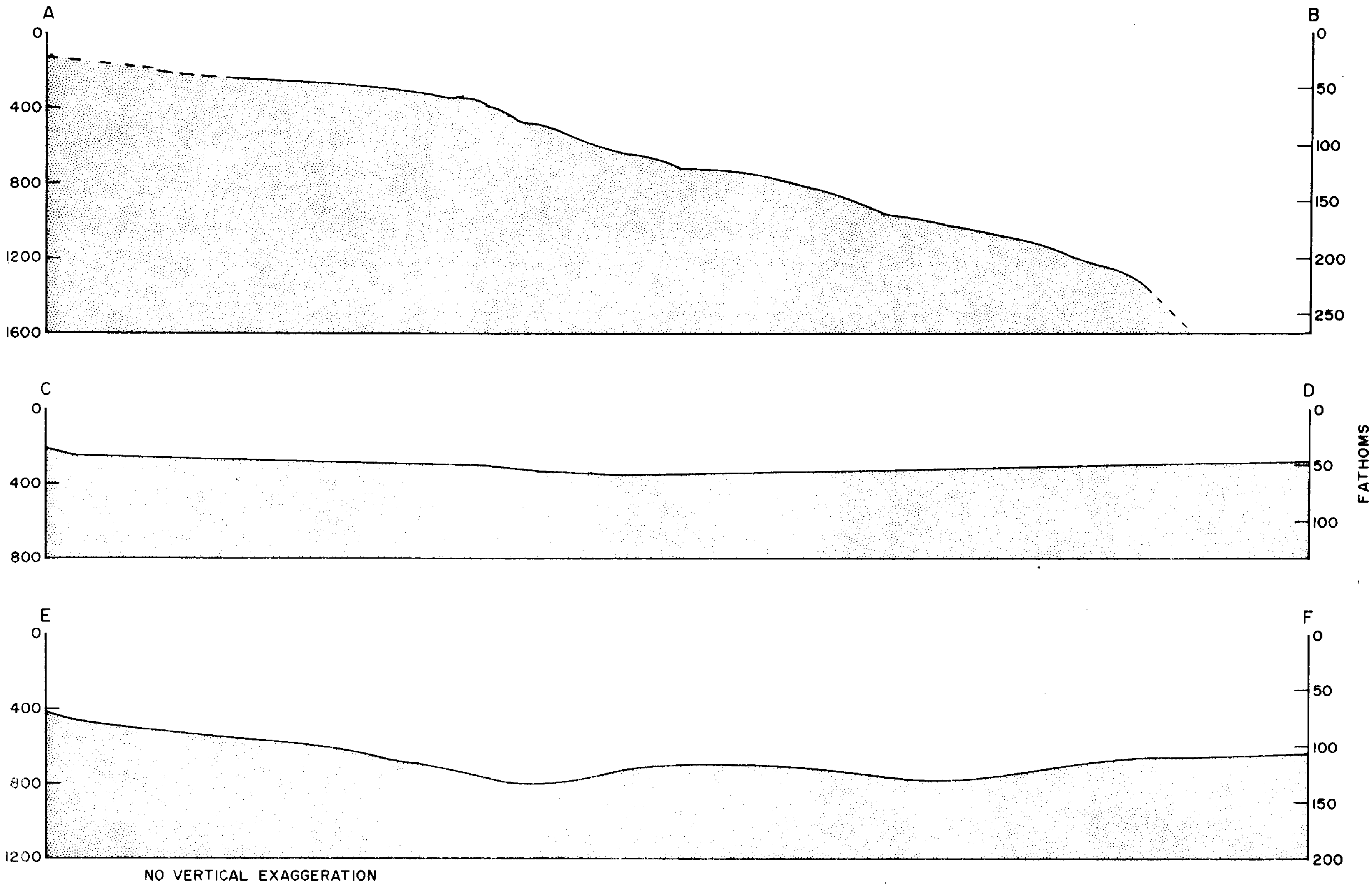
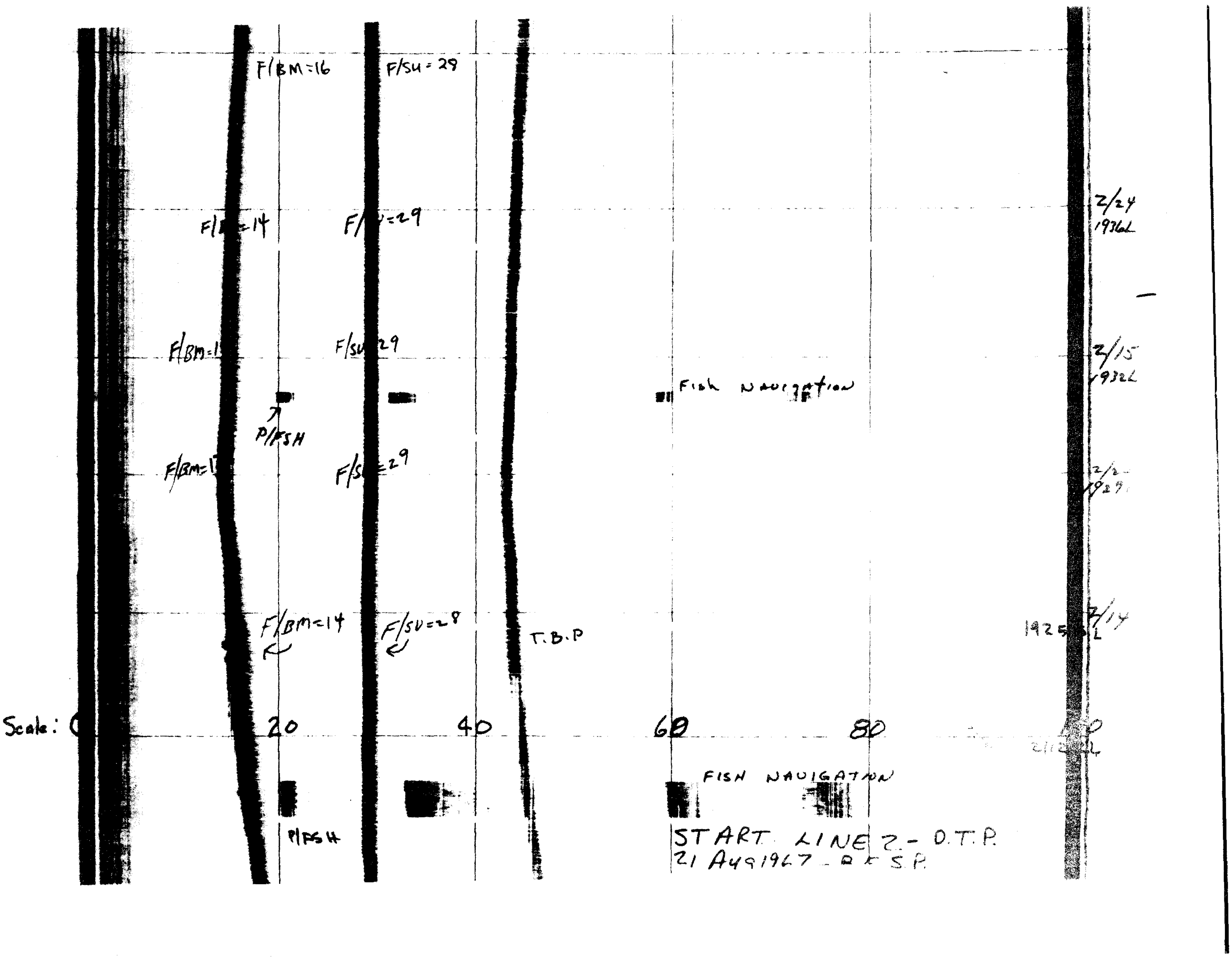
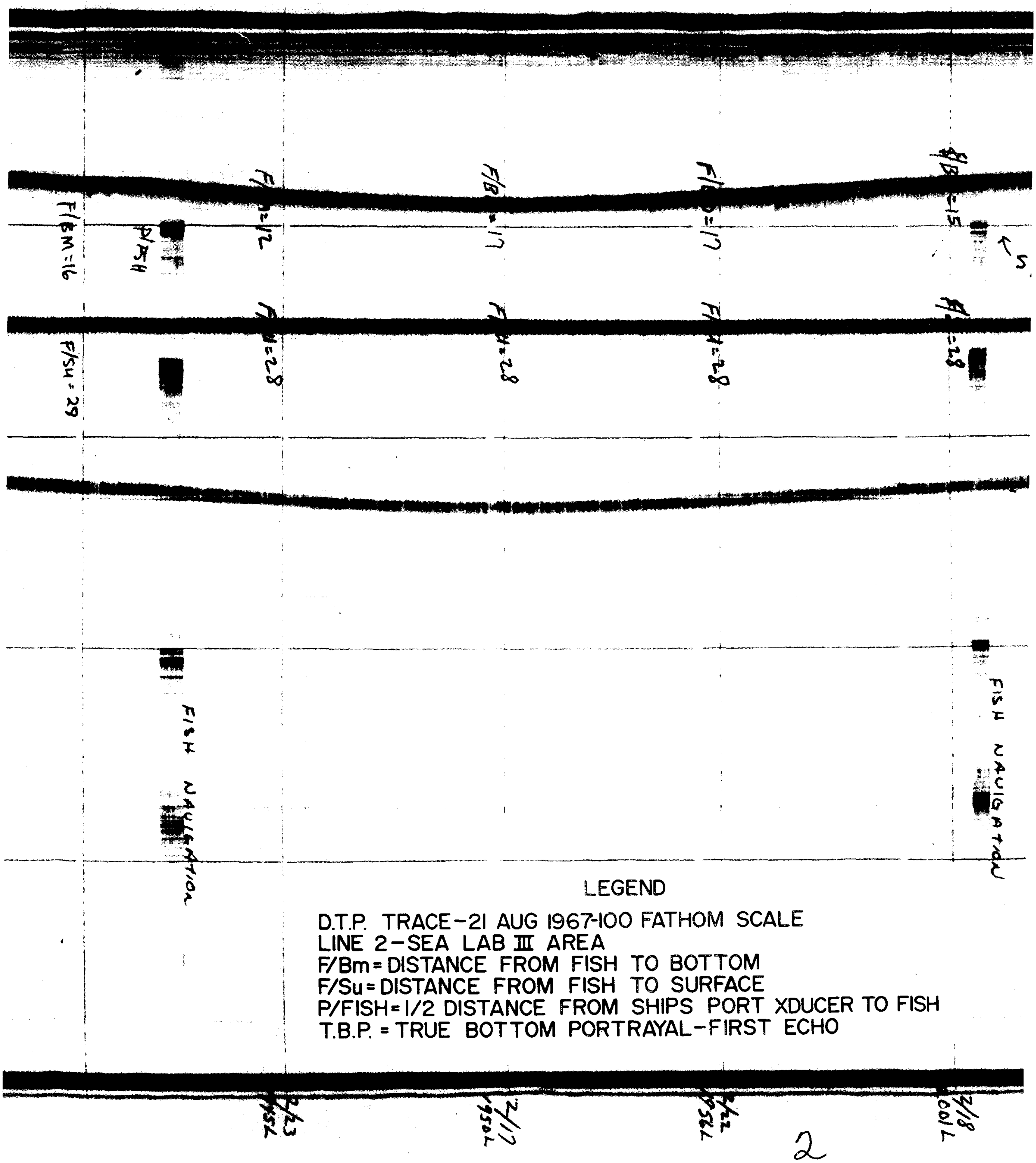


FIGURE 4 SEA LAB III AREA CROSS-SECTIONS

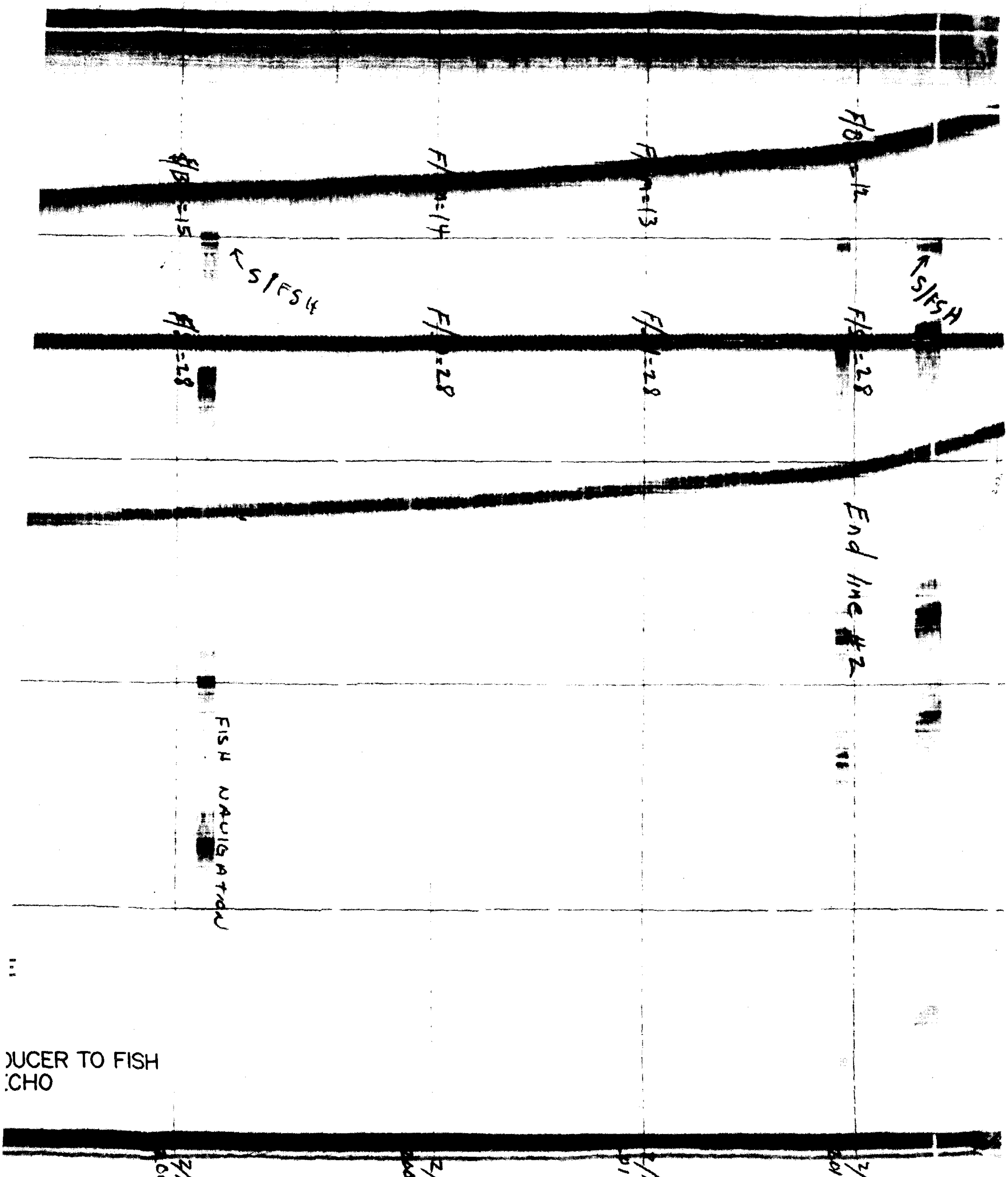


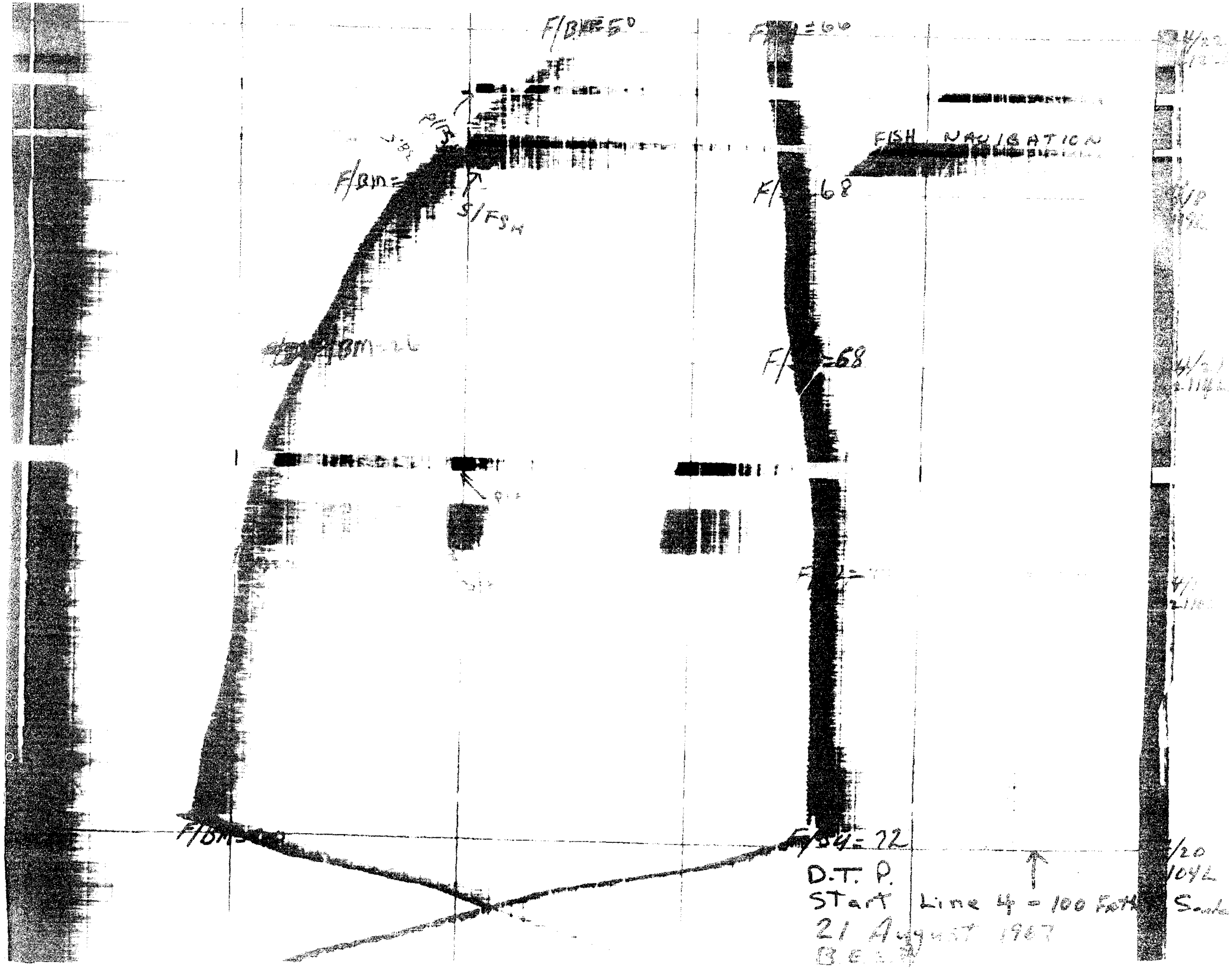
F/BM=16
F/SU=29
F/BM=14
F/SU=29
F/BM=1
F/SU=29
P/FSH
Fish Navigation
F/BM=1
F/SU=29
F/BM=14
F/SV=28
T.B.P
Scale: 0
20
40
60
80
FISH NAVIGATION
P/FSH
START LINE 2 - O.T.P.
21 Aug 1967
2/24 1936L
2/15 1932L
1925



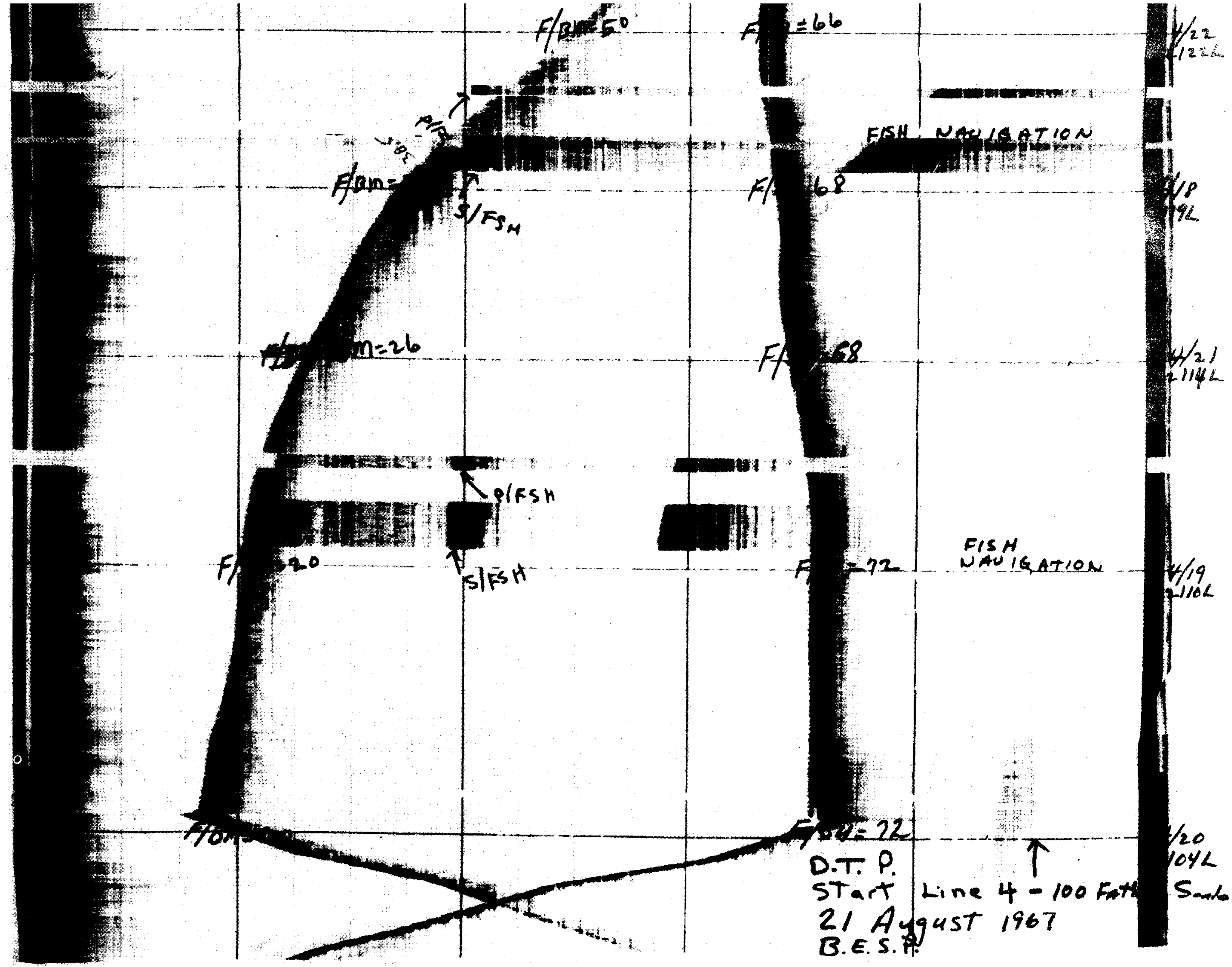
2

FIGURE 5 PGR TRACE OF LINE 2


S/FSH
S/FSH
End line #2
FISH NAVIGATION
DUCER TO FISH
CHO



F/BM=50
F/=66
FISH NAVIGATION
F/BM=
S/FSH
F/=68
F/=68
F/SU=22
D.T.P.
START Line 4 = 100 Fath Scale
21 August 1967



F/BM=50
F/ =66
P/F
38.5
F/BM=
S/FSH
F/ 68
FISH NAVIGATION
F/ 68
m=26
P/FSH
S/FSH
F/ 20
F/ 72
FISH NAVIGATION
F/BM=72
D.T.P.
Start Line 4 - 100 Fath
21 August 1967
B.E.S.P.
4/22 122L
4/18 19L
4/21 2114L
4/19 2110L
4/20 104L
Sand

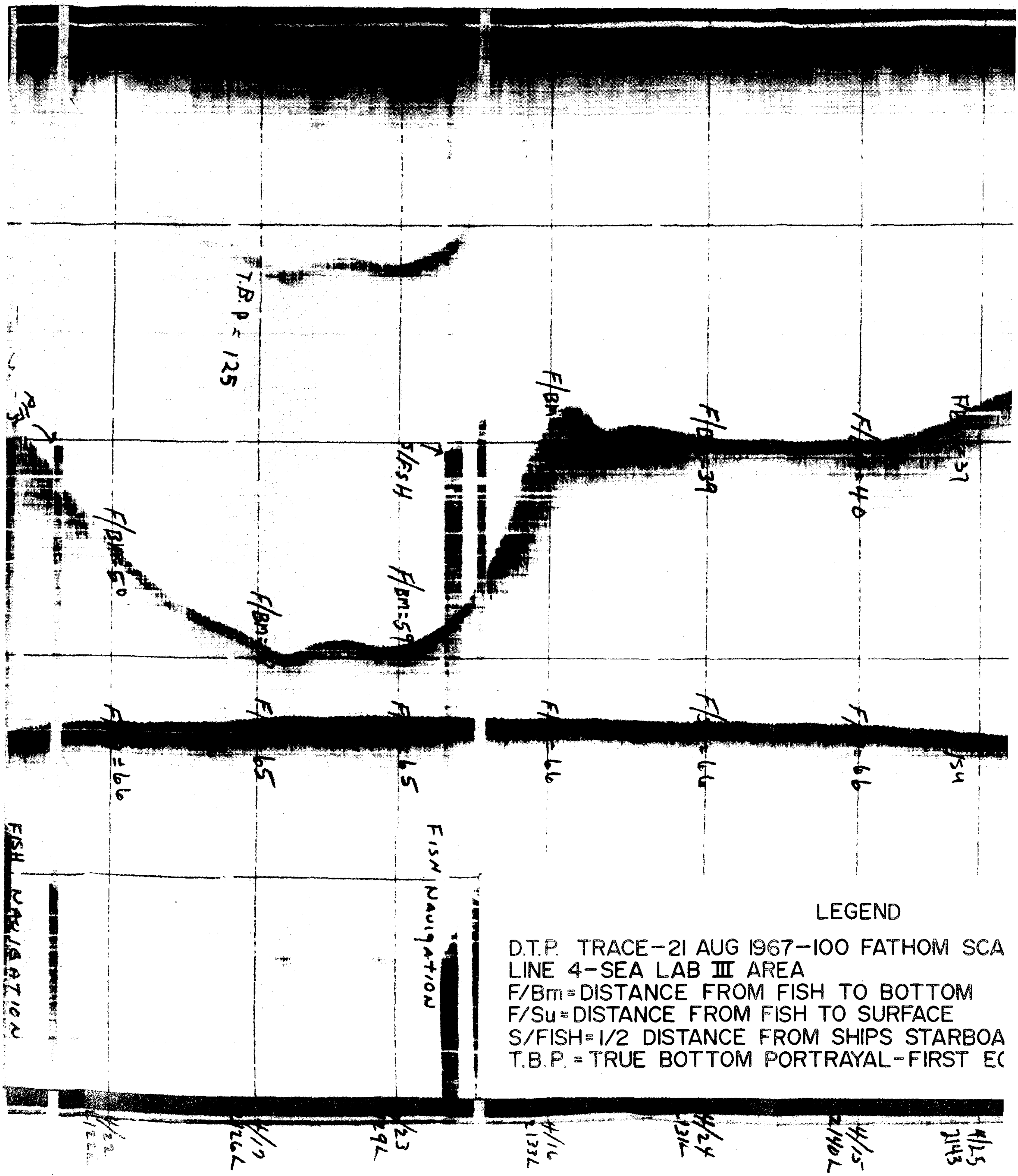
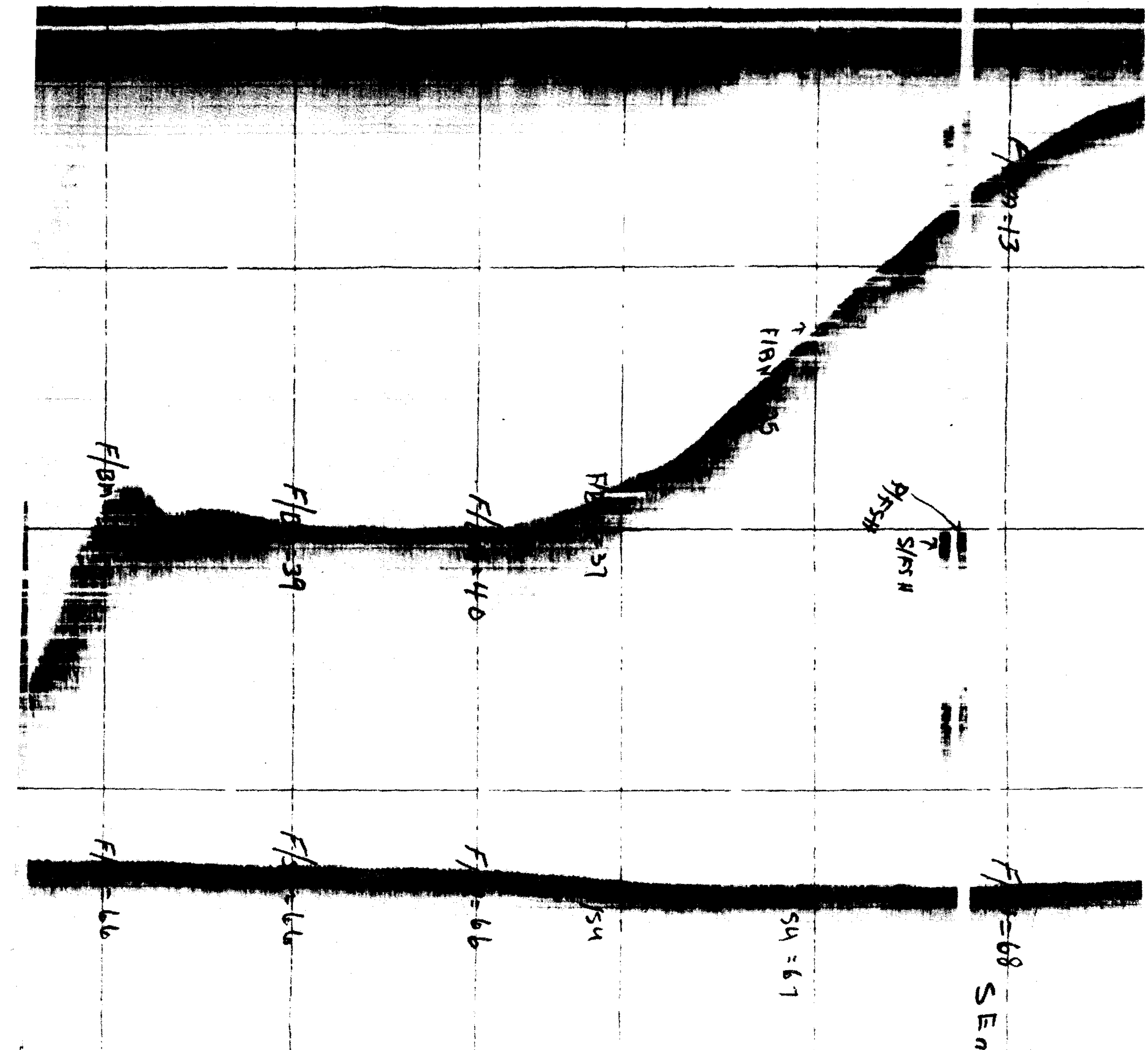


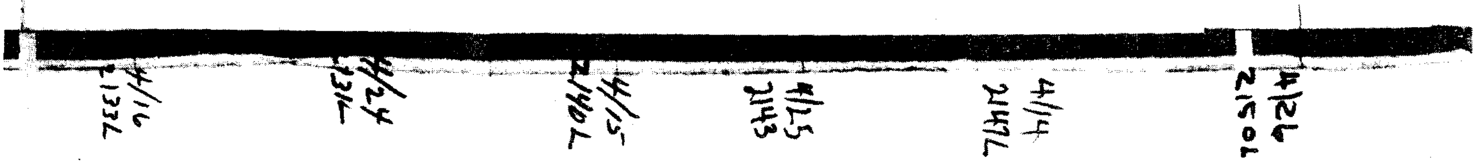
FIGURE 6 PGR TRACE OF LINE 4

2



LEGEND

D.T.P. TRACE—21 AUG 1967—100 FATHOM SCALE
LINE 4—SEA LAB III AREA
F/Bm = DISTANCE FROM FISH TO BOTTOM
F/Su = DISTANCE FROM FISH TO SURFACE
S/FISH = 1/2 DISTANCE FROM SHIPS STARBOARD XDUCER TO FISH
T.B.P. = TRUE BOTTOM PORTRAYAL—FIRST ECHO



LINE 4

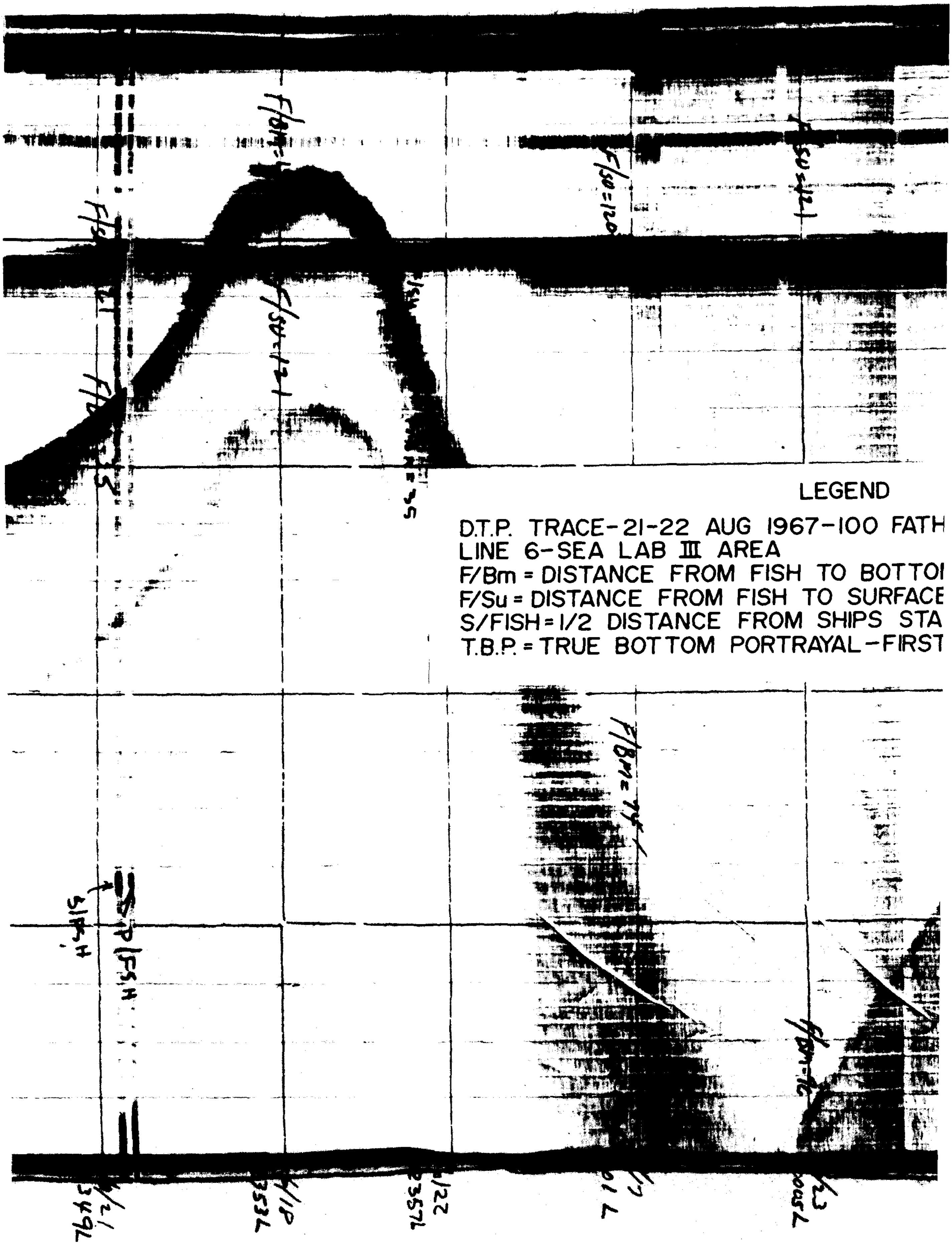
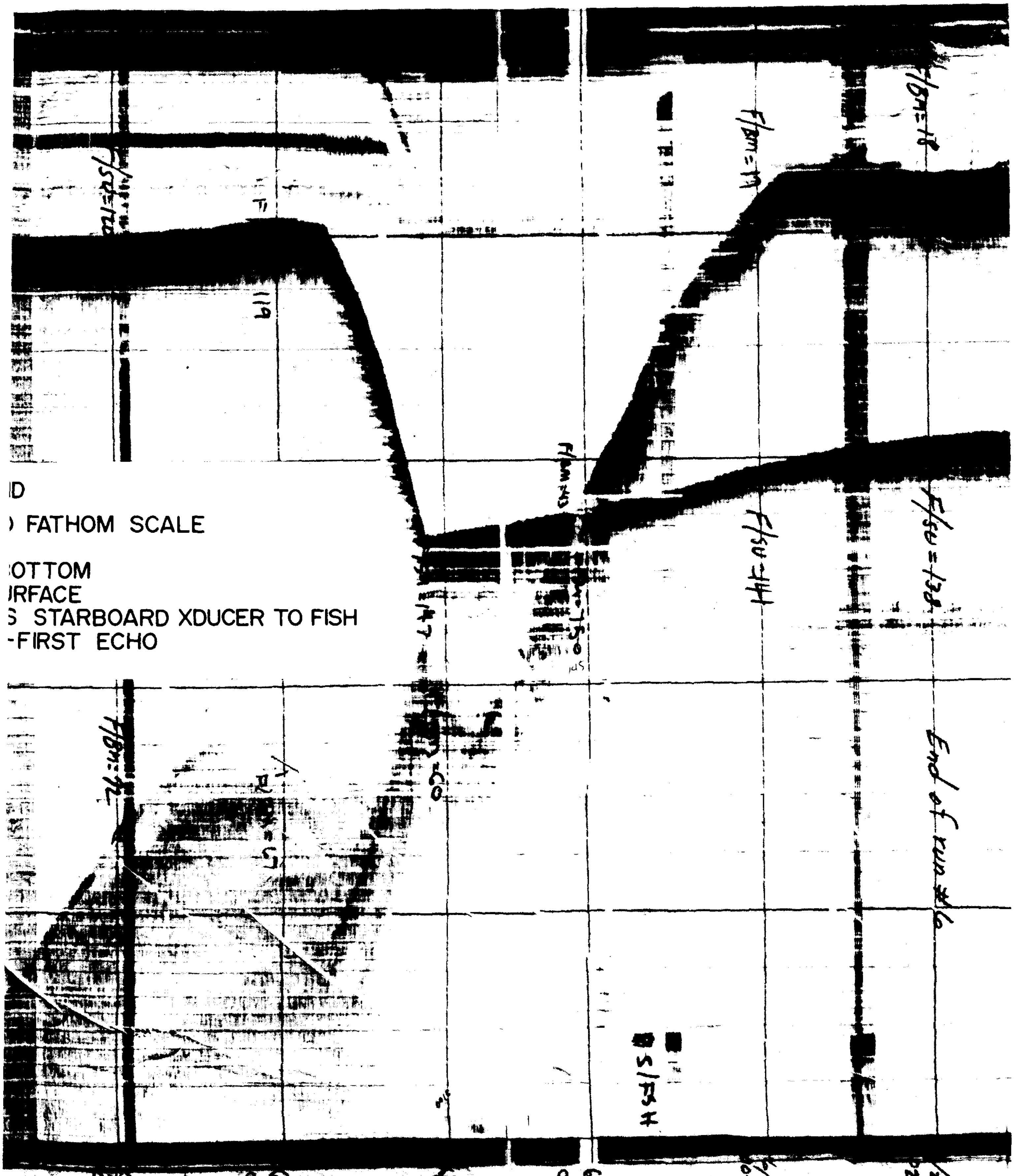


FIGURE 7 PGR TI

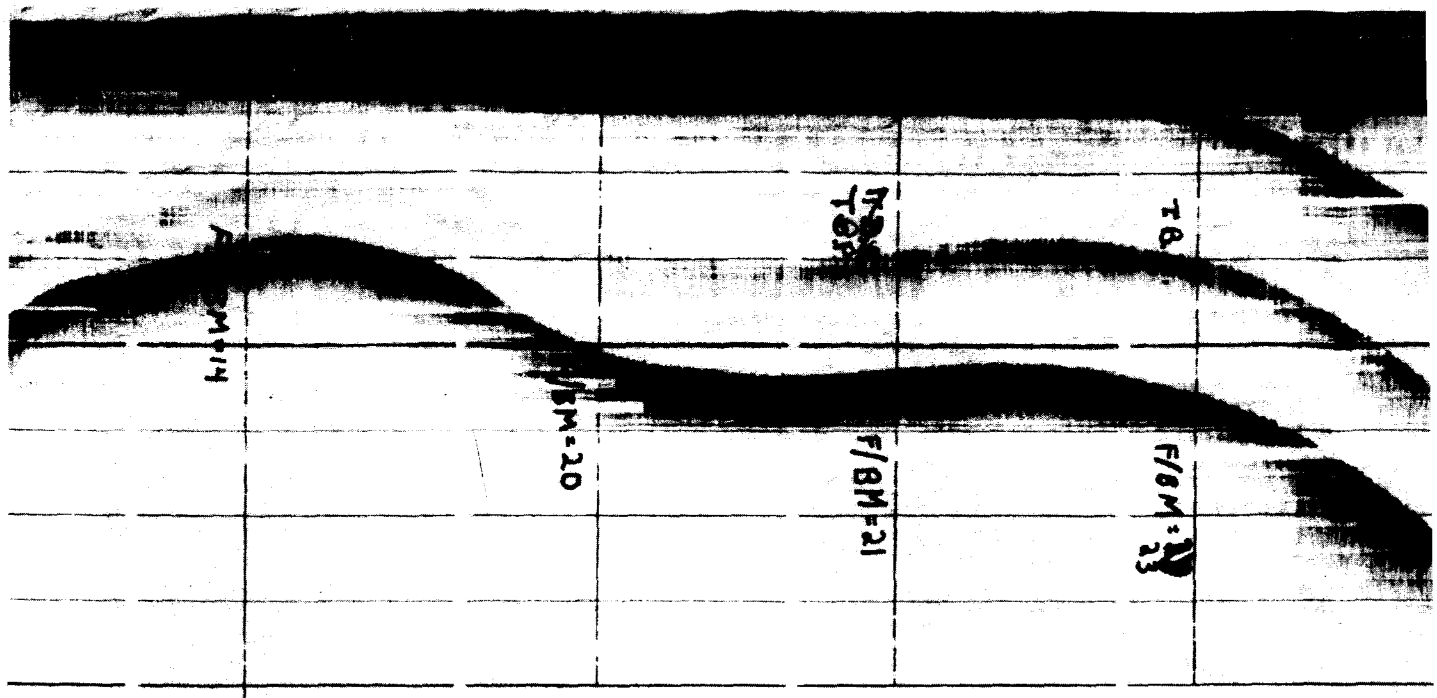


ID
) FATHOM SCALE

OTTOM
RFACE
S STARBOARD XDUCER TO FISH
-FIRST ECHO

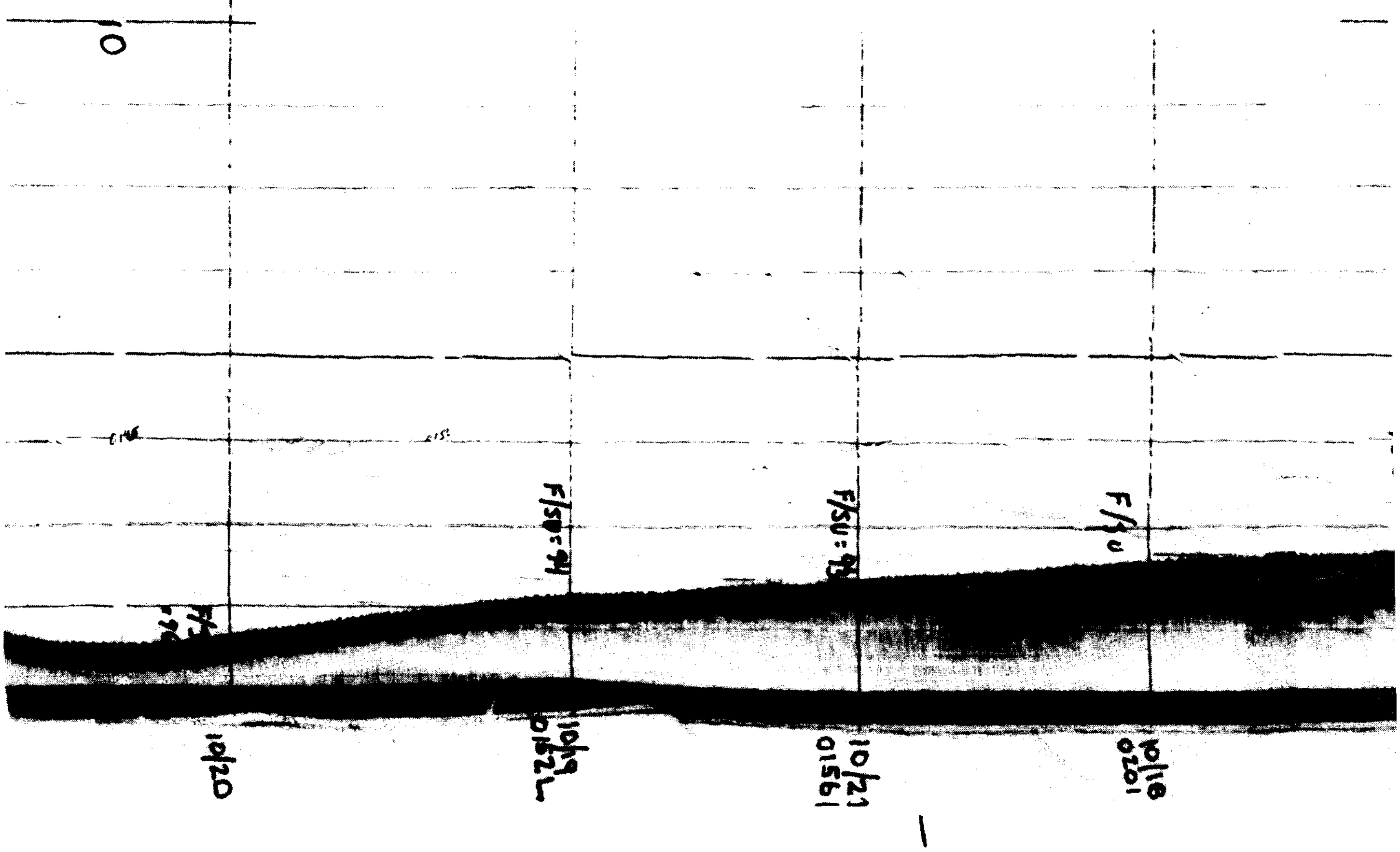
7 PGR TRACE OF LINE 6

2



LEGEND

D.T.P. TRACE–21 AUG 1967–100 FATHOM SCALE
LINE 10–SEA LAB III AREA
F/Bm = DISTANCE FROM FISH TO BOTTOM
F/Su = DISTANCE FROM FISH TO SURFACE
/FISH = 1/2 DISTANCE FROM SHIPS PORT XDUCER TO FISH
T.B.P. = TRUE BOTTOM PORTRAYAL–FIRST ECHO



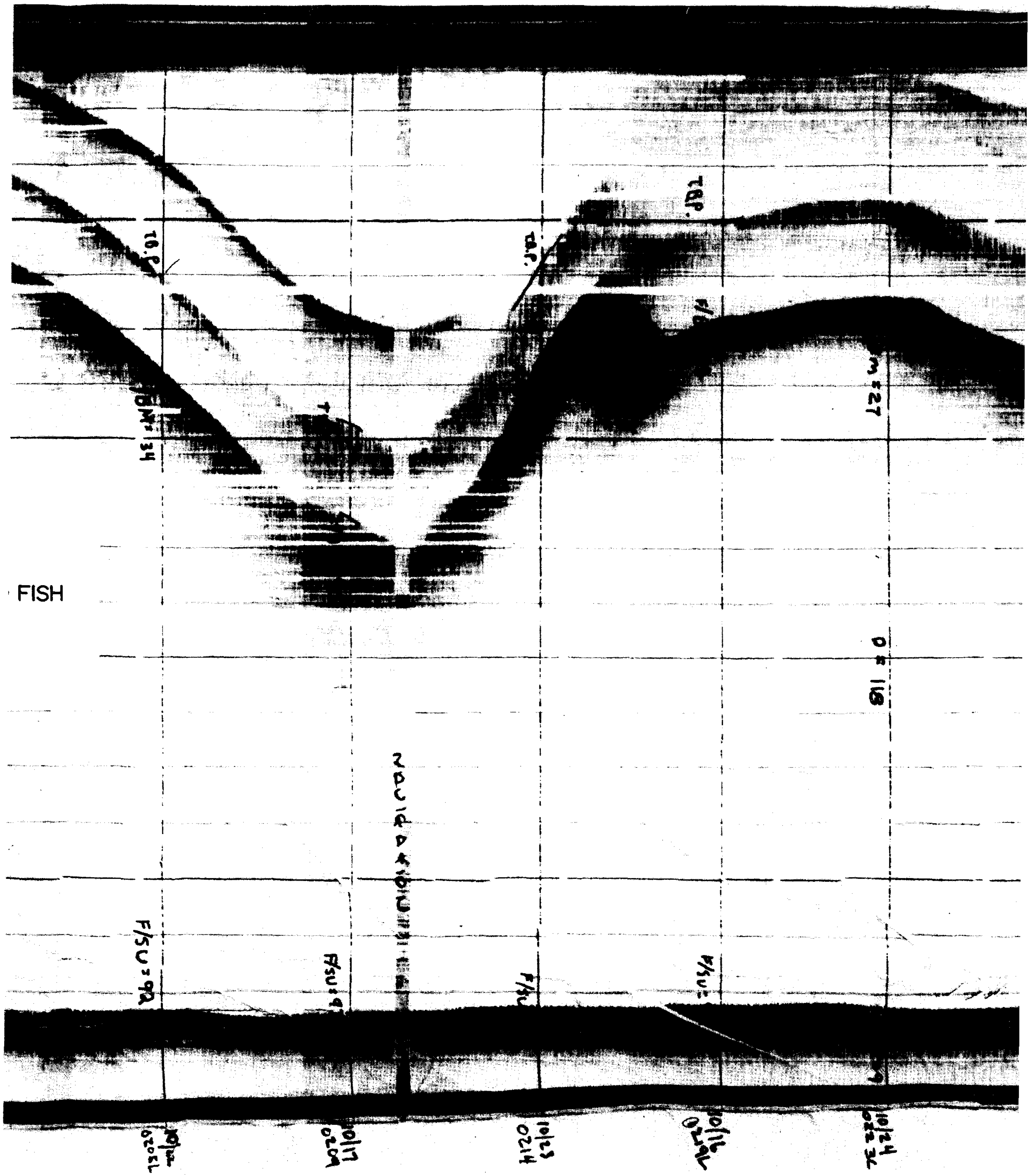
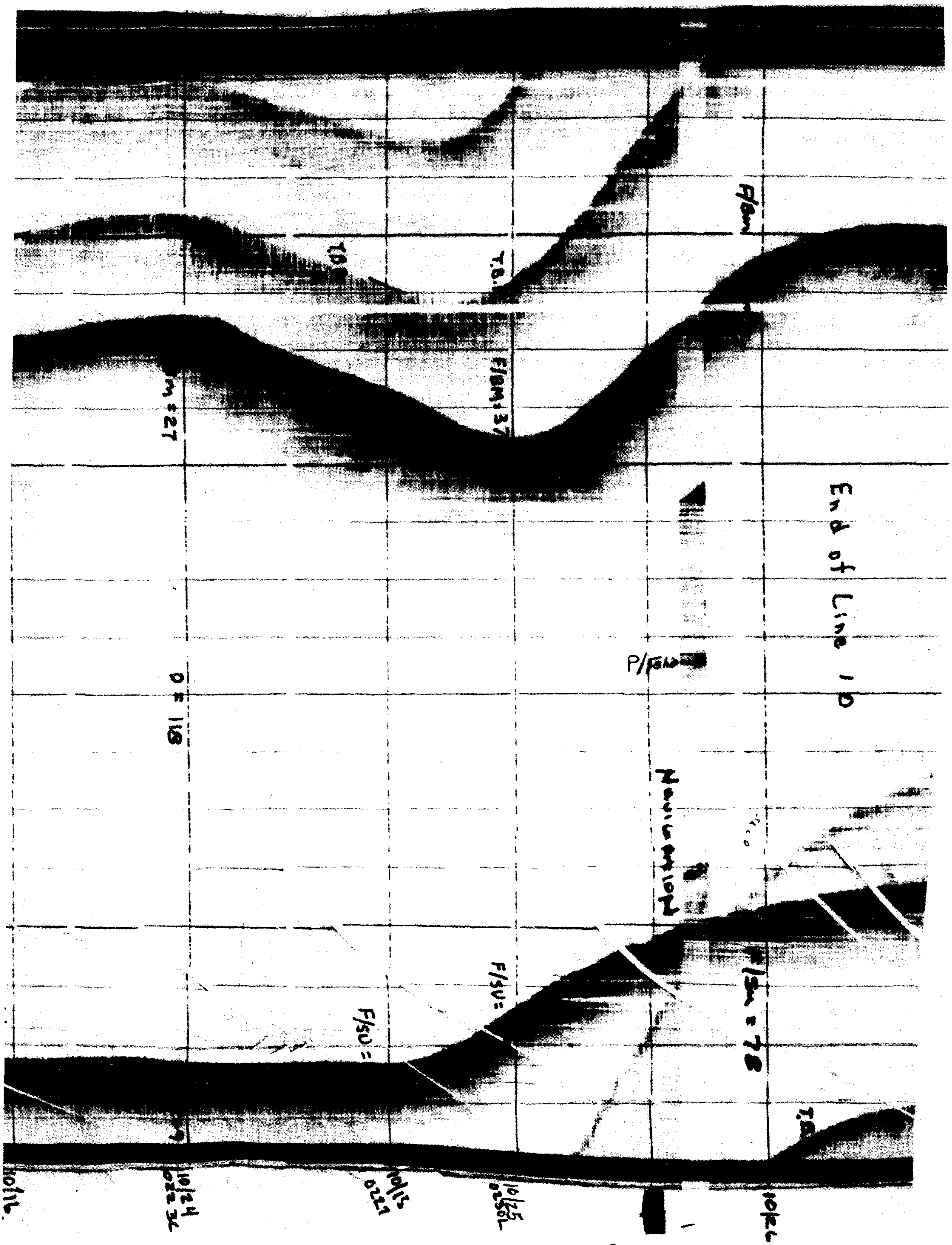


FIGURE 8 PGR TRACE OF LINE 10


End of Line 10
F/BM
T.B.
F/BM=37
D = 118
Navigation
F/SU =
F/SU =
10/26
10/25
10/24
10/16

III. BOTTOM SAMPLES

General

Four bottom samples were collected in the SEA LAB III area. The locations of the sampling sites are shown in Figure 3.

Methods and Procedures

Three cores were attempted at location #1 with a Kullenberg corer. One other sample was obtained using a Nansen bottle. The samples were analyzed for size at the NAVOCEANO Pacific Support Group Facility at San Diego, California. The analysis were performed using standard laboratory techniques of sieving and pipetting as outlined by Krumbein and Pettejohn (3).

Analysis and Results

Although three coring attempts were made at location #1, only a surface sample of shelly sand was obtained for each attempt. All four of the samples consisted of medium to coarse, organic and nonorganic, shelly sands with traces of volcanic material. Summary and log sheets are presented in Appendix A.

IV. PHYSICAL OCEANOGRAPHY

General

Nansen casts were made in the SEA LAB III area to determine the physical characteristics of the water column.

Methods and Procedures

Temperature and salinity data were taken by standard Nansen casts at five stations in the SEA LAB III area (Figure 3). Water temperatures and sampling depths were obtained with paired protected and unprotected deep-sea reversing thermometers attached to the Nansen bottles. Temperatures and depths were computed in accordance with H.O. Pub. No. 607, (4). The water samples obtained with the Nansen bottles were analyzed for salinity using an inductive salinometer.

The Nansen cast data were calculated, coded, and forwarded to the National Oceanographic Data Center (NODC) for computer calculations of density, sound velocity, specific volume anomalies, and thermometric depths. These data are presented in Appendix B.

Analysis and Results

At station #1, the Nansen bottles were spaced from surface to bottom. At the other four stations, all the bottles were concentrated near the bottom to detect any small deviations from the smooth temperature/depth curve. The maximum temperature measured was 18.46°C at the surface of station #1. The minimum temperature was 6.82°C at 355 meters of station #5. At the bottom of station #5 a small positive temperature gradient was detected.

V. CURRENTS

General

Three current meter arrays were planted at the locations shown in Figure 1. These locations were chosen in order to obtain a representation of the current regime around the perimeter of the SEA LAB III area.

Methods and Procedures

Each of the three arrays consisted of three Geodyne A-101 16mm film recording Current Meters and Geodyne A-393 or Braincon 422 Release Mechanisms. The arrays were planted on 7 July and the releases were programmed to activate on 18 August 1967. A TRB and Patrol Boat from San Clemente Island were used to retrieve #2 and #3 arrays on this date. Array #1 failed to surface. The data on the film was transferred to magnetic tape at NAVOCEANO and the tape was used to prepare speed and direction histograms and a polar coordinate plot of speed versus direction. Zero current speed was not included in the computations. The plots are presented in Figures 9 to 17.

Analysis and Results

Three of the six meters retrieved functioned properly and are referenced in this report. Meter #327 was arrayed 12 feet above the bottom in a water depth of approximately 260 fathoms. Meters #309 and #321 were arrayed 8 feet and 36 feet respectively above the bottom in a water depth of 100 fathoms. The primary direction vectors of all meters are to the southeast and northwest. This indicates that at these locations and depths the current reverses along an axis essentially parallel to San Clemente Island. Although speeds of 0.5 knots were recorded, the predominant current speeds varied from 0.0 to 0.2 knots (0.0 to 10.3 cm./sec.).

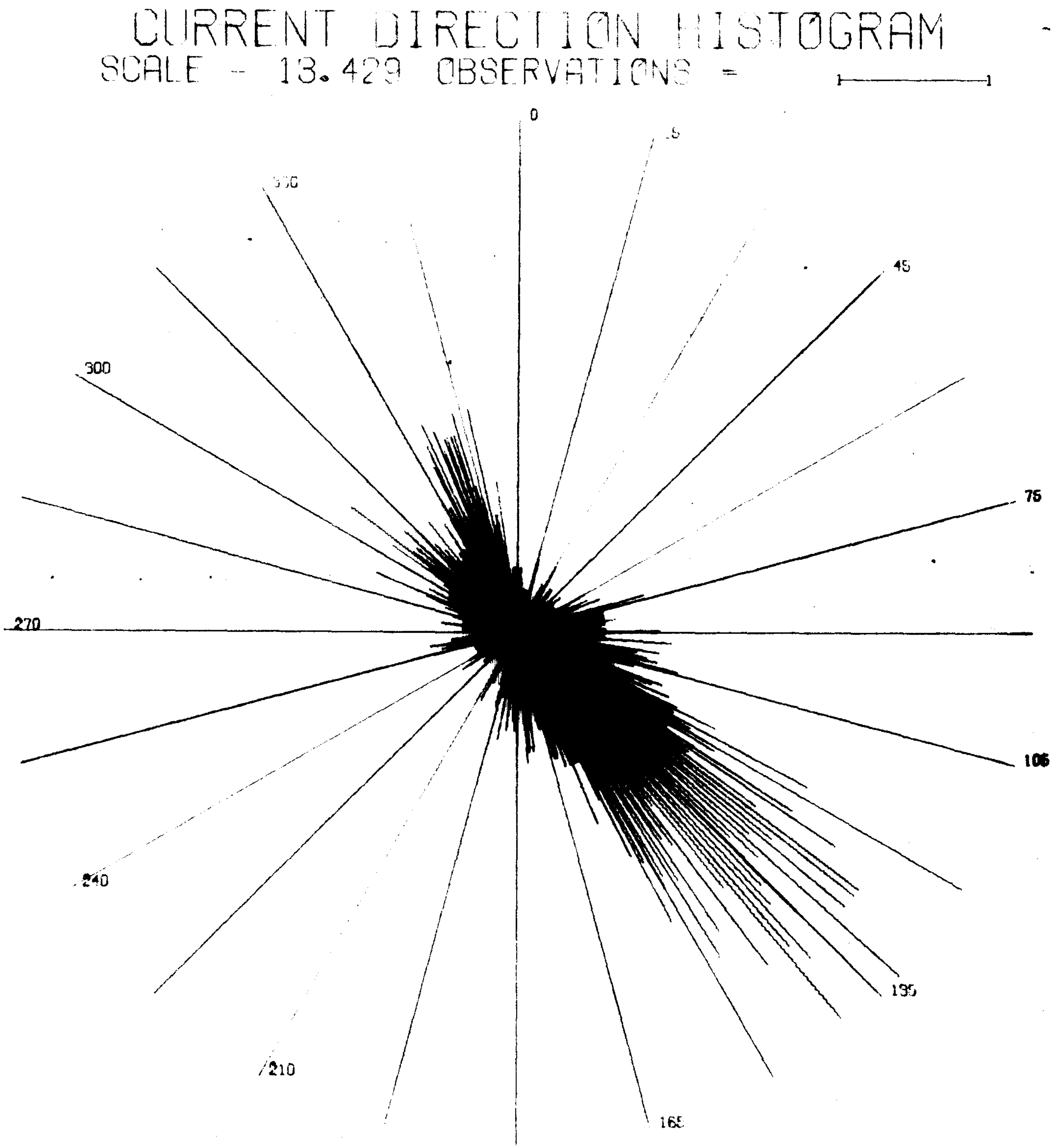


FIGURE 9 CURRENT DIRECTION HISTOGRAM - METER 327

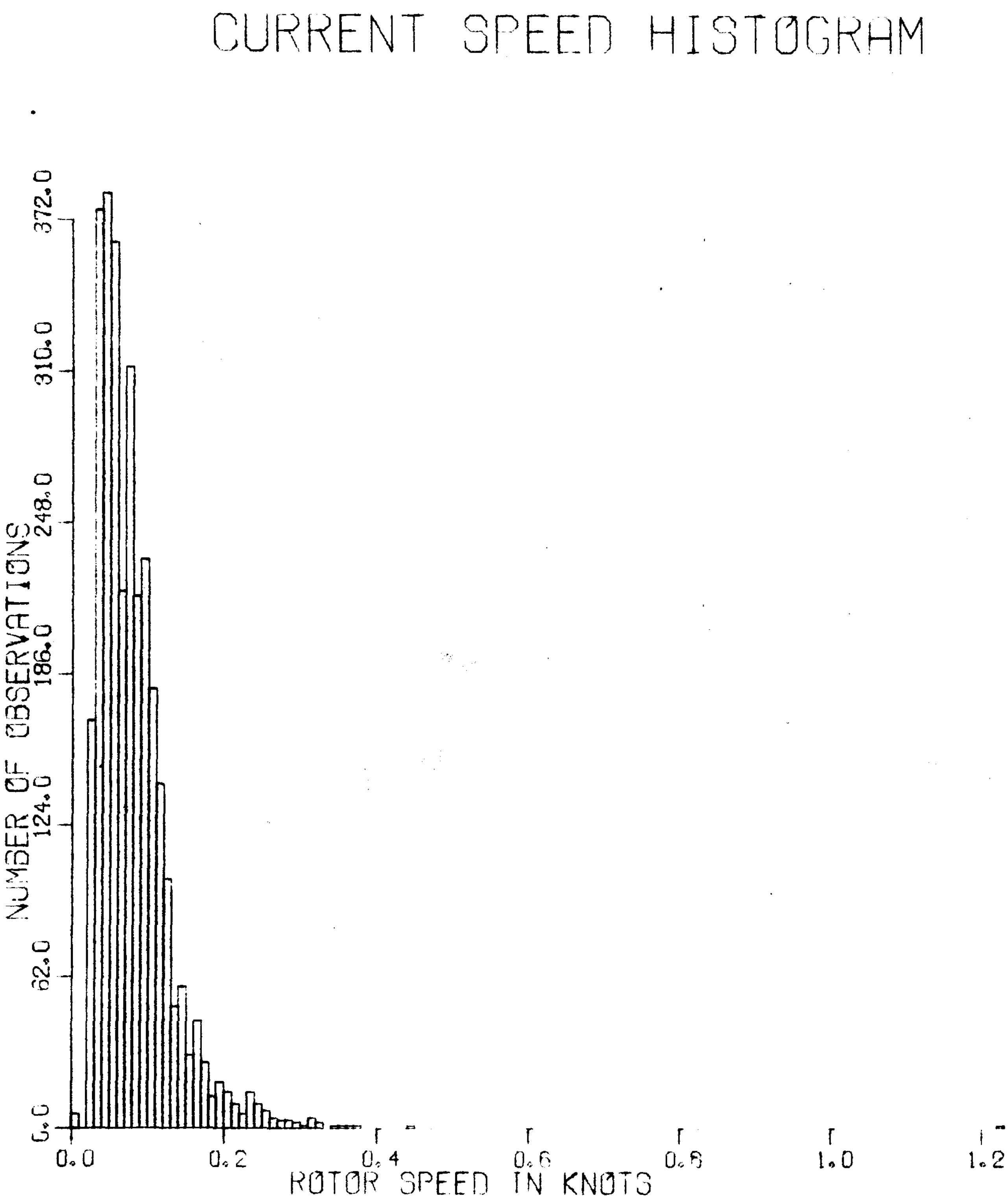


FIGURE 10 CURRENT SPEED HISTOGRAM - METER 327

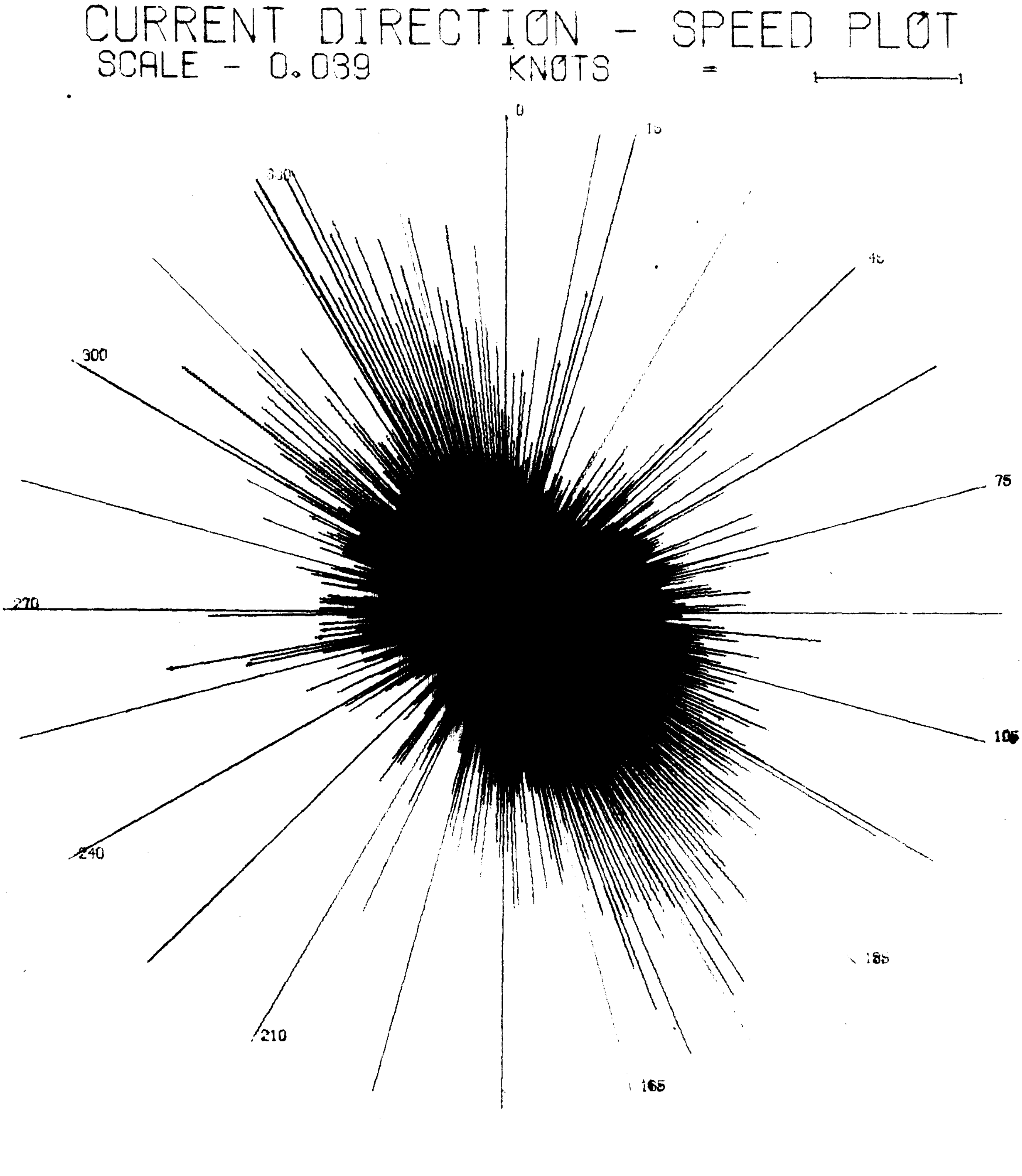


FIGURE 11 CURRENT DIRECTION VS. SPEED-METER 327

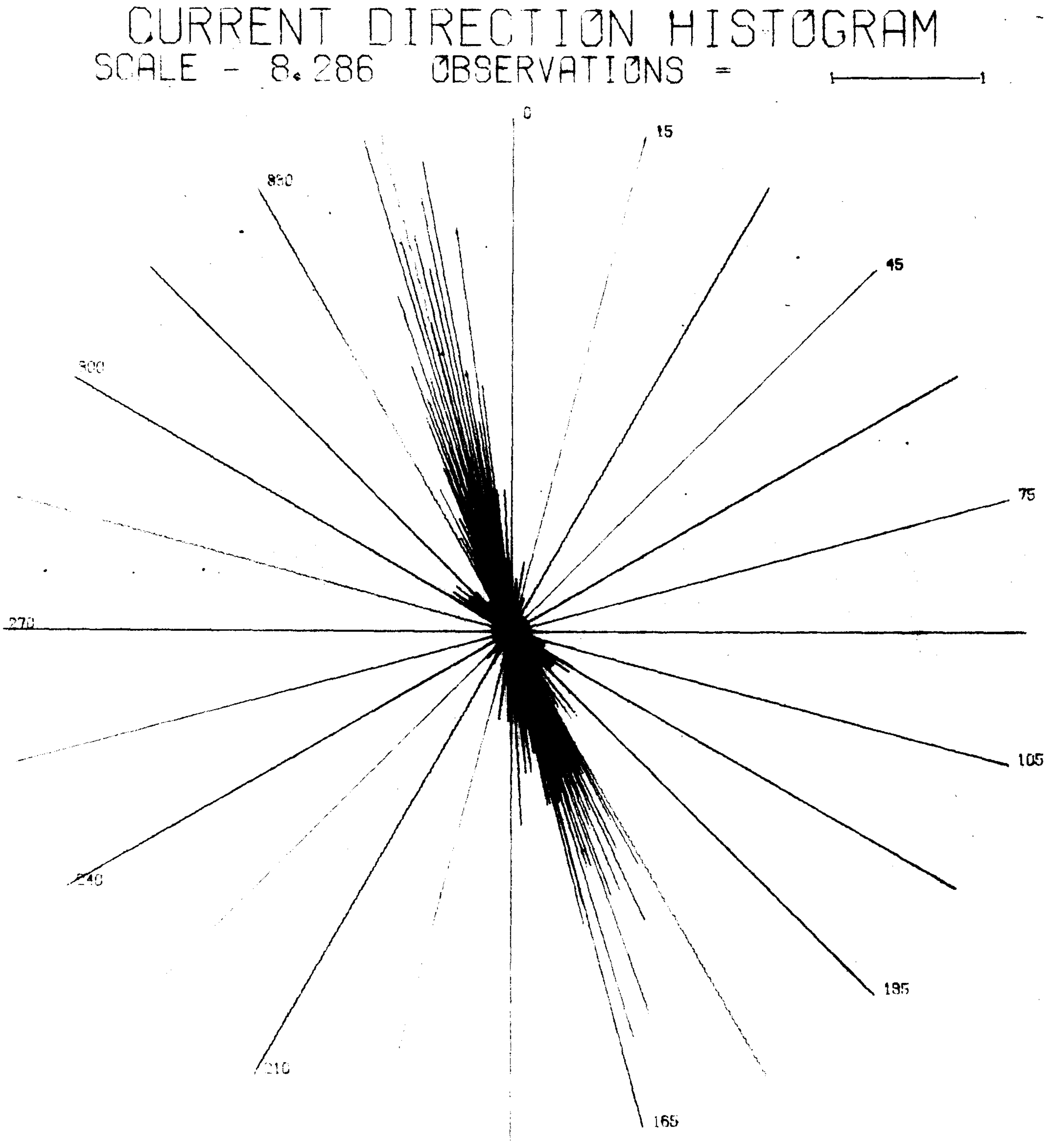


FIGURE 12 CURRENT DIRECTION HISTOGRAM -METER 309

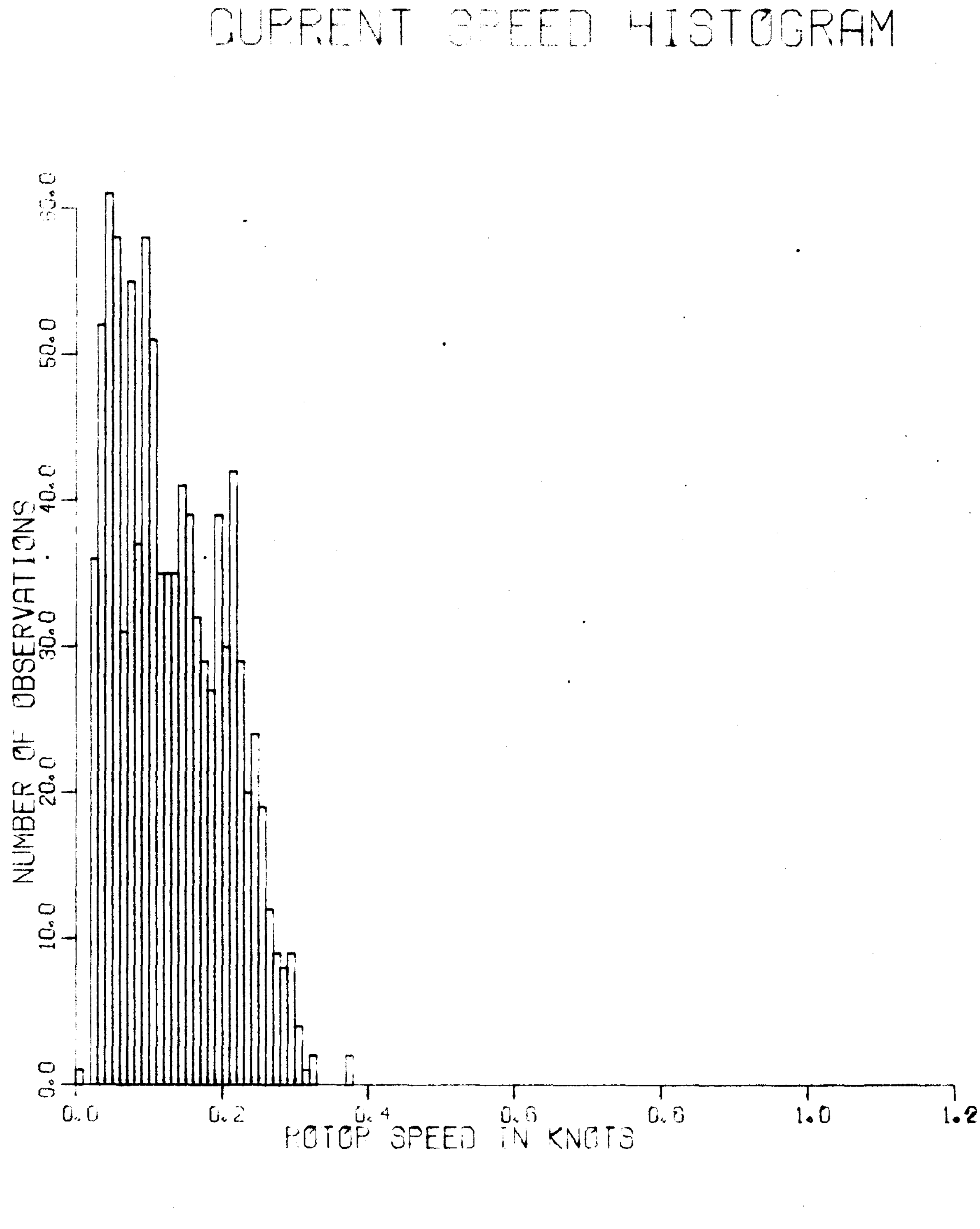


FIGURE 13 CURRENT SPEED HISTOGRAM - METER 309

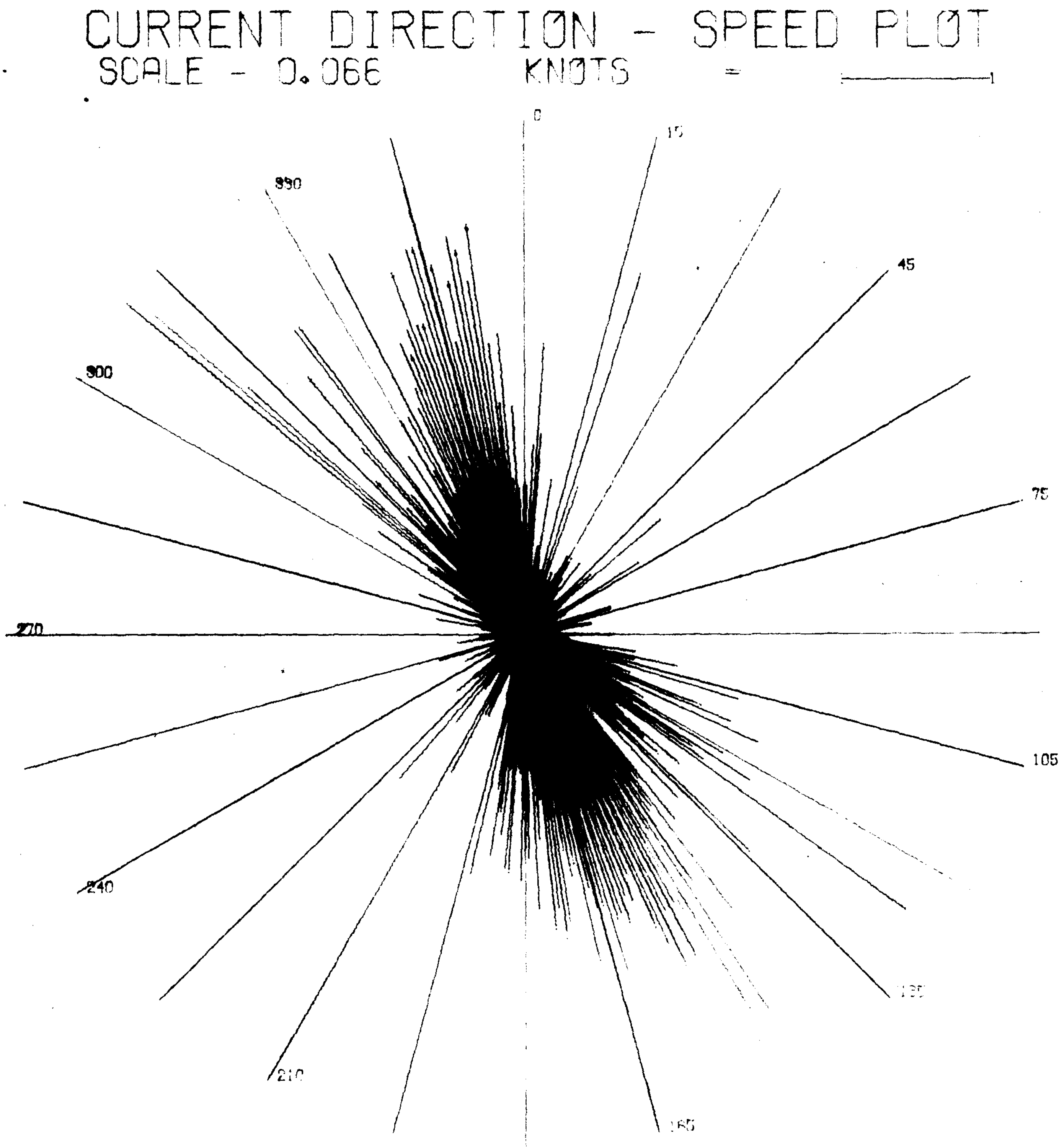


FIGURE 14 CURRENT DIRECTION VS. SPEED - METER 309

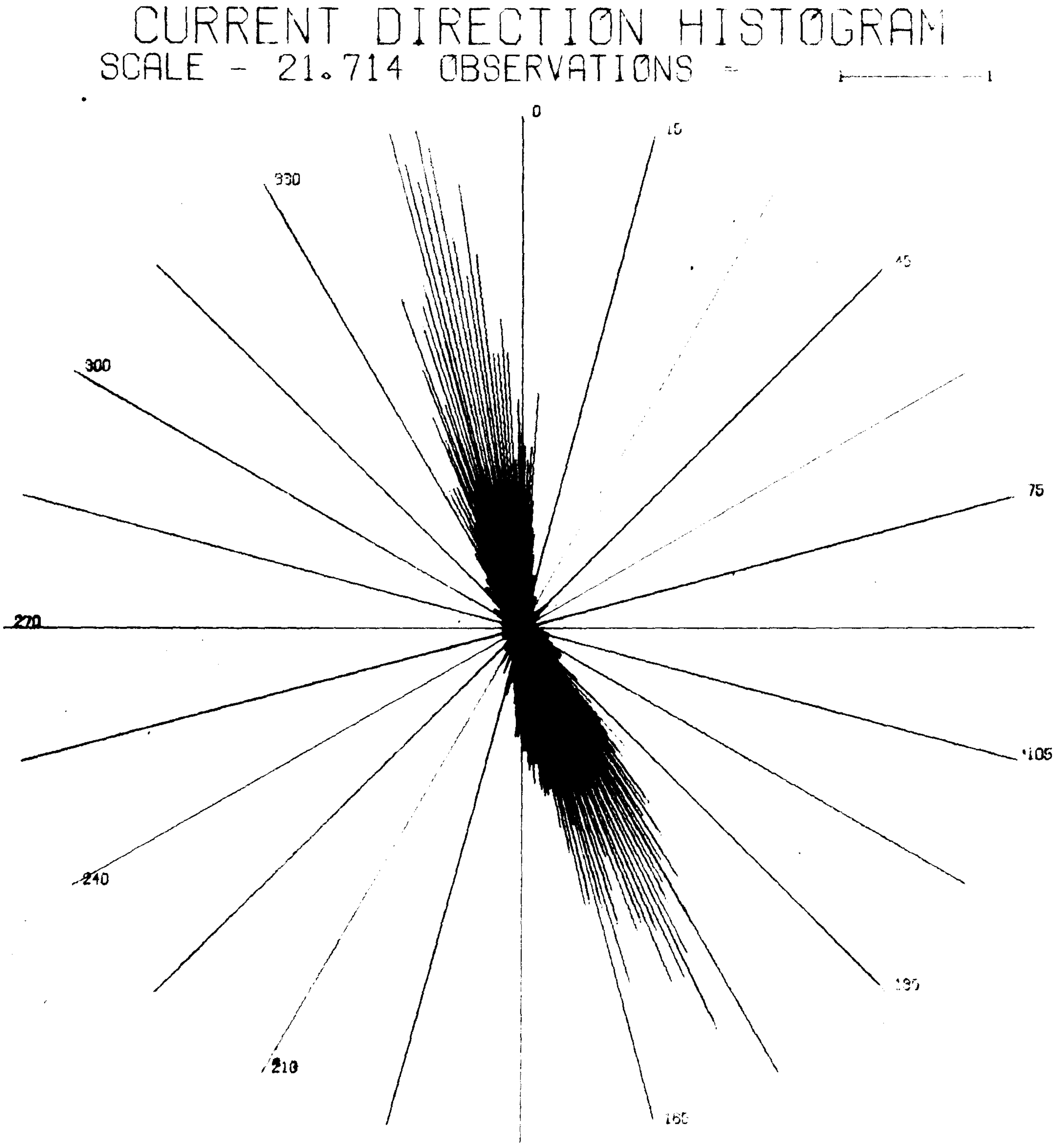


FIGURE 15 CURRENT DIRECTION HISTOGRAM - METER 321

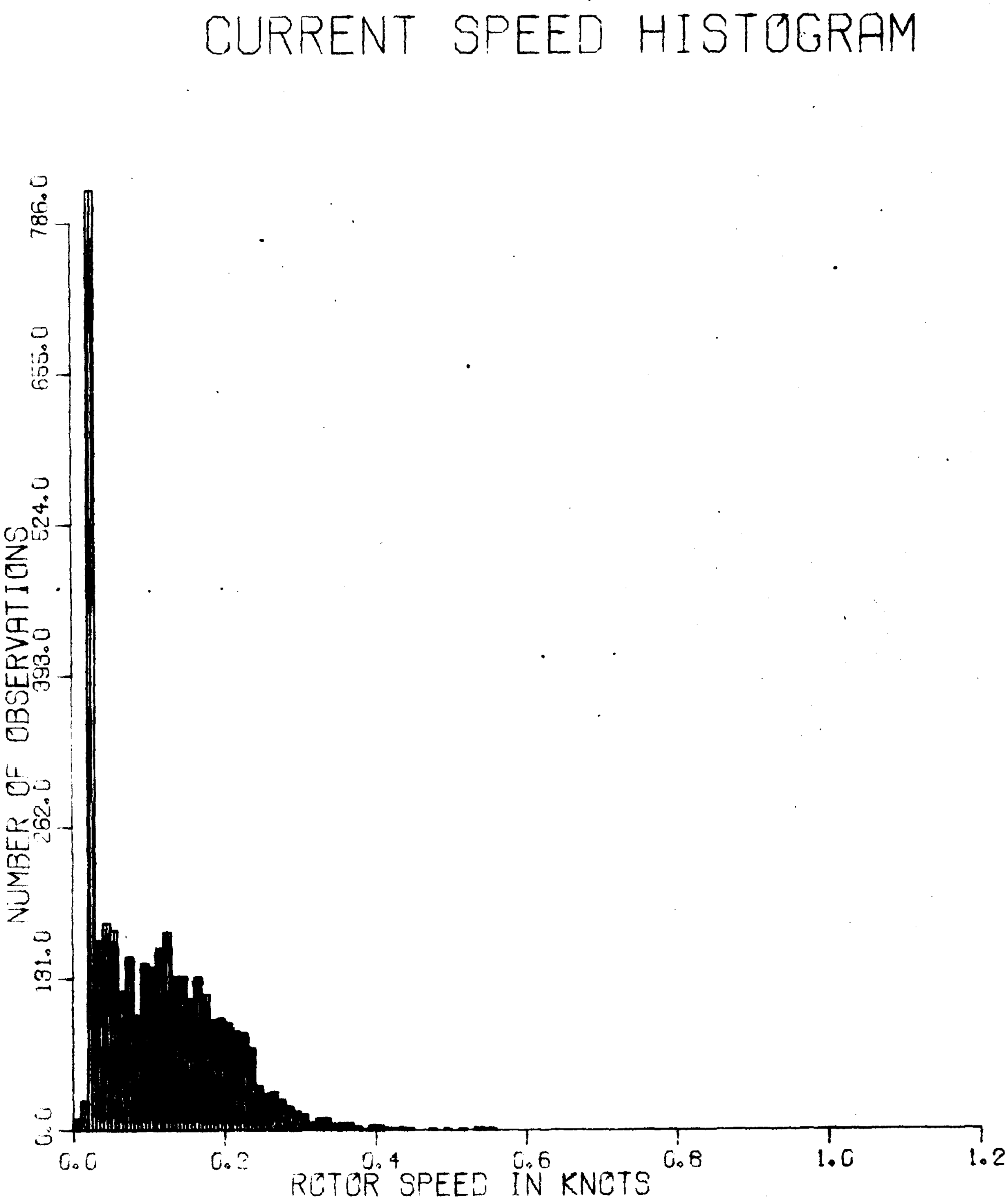


FIGURE 16 CURRENT SPEED HISTOGRAM - METER 321

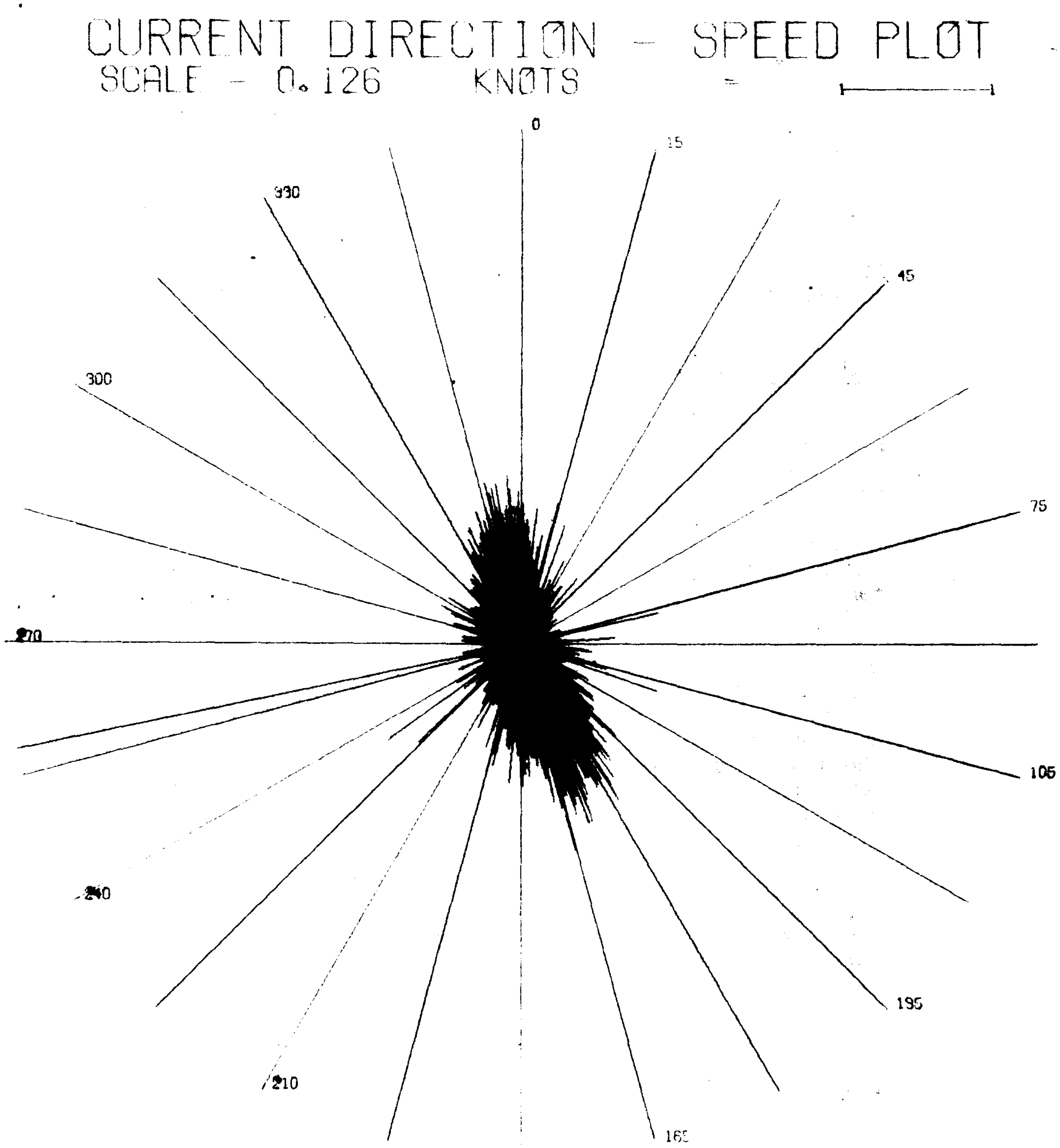


FIGURE 17 CURRENT DIRECTION VS. SPEED - METER 321

VI. BOTTOM ENVIRONMENTAL SENSING SYSTEM

General

The Bottom Environmental Sensing System (BESS) (Figure 18) is an in situ system used to measure the current speed and direction, and temperature (5). It also obtains photographs of the bottom which are subsequently used to determine the maximum/minimum visibility periods and sediment characteristics. The system was used operationally for the first time during this survey. It was deployed at 1815L 21 August 1967 in 42 fathom and retrieved 1800L 22 August at 32°59' 13.2"N and 118°31' 42.7"W as determined by Randall Radar on S.C.I.

Methods and Procedures

The current and temperature data were collected using a Hydro Products Model 501 In Situ Current Meter. This system utilizes a Savonius rotor to measure the current speed to ±3%, magnetic compass to measure direction to ±5%, and a thermistor to measure temperature to ±3%. These data were plotted on a Rustrak recorder strip chart (Figures 19 & 20). The current speed and direction and temperature readings were scaled every 15 minutes, tabulated (Table I) and graphed as a function of time (Figure 21).

An E.G.&G. Model 205/206 Camera/Strobe System synchronized with a specially designed sequence timer was used to obtain bottom pictures, visibility data, and sediment characteristics. The relative maximum/minimum visibility periods were determined using two target rods painted with white and gray rectangles. The 35mm camera obtained a photograph of these targets every hour during deployment. The film was developed and densities were measured with a 0.5mm aperature densitometer. These densities were then plotted as a function of time (Figure 22).

Penetrometers were used to gain an index of the sediment strength characteristics. Prior to deployment, two penetrometers were fastened to the BESS with magnesium wire. This wire corroded due to the effect of salt water allowing the penetrometers to fall and imbed in the sediment. After the penetrometers are calibrated (penetration vs. shear strength), an index of the sediment shear strength will be ascertained from the photographs.

Analysis and Results

Currents. Of the 93 current speed and temperature readings scaled from the strip chart recording, 26 were below 0.5 knots, 47 were 0.5 knots, and 20 were above 0.5 knots. The minimum speed of 0.3 knots occurred at 1915L 21 August. The maximum speed of 0.7 knots occurred between 0430-0500L 22 August. The current direction trace on the recording is off scale and although a constant vector to the north is indicated, it is considered questionable. The temperature readings vary between 11.0°C and 12.0°C.

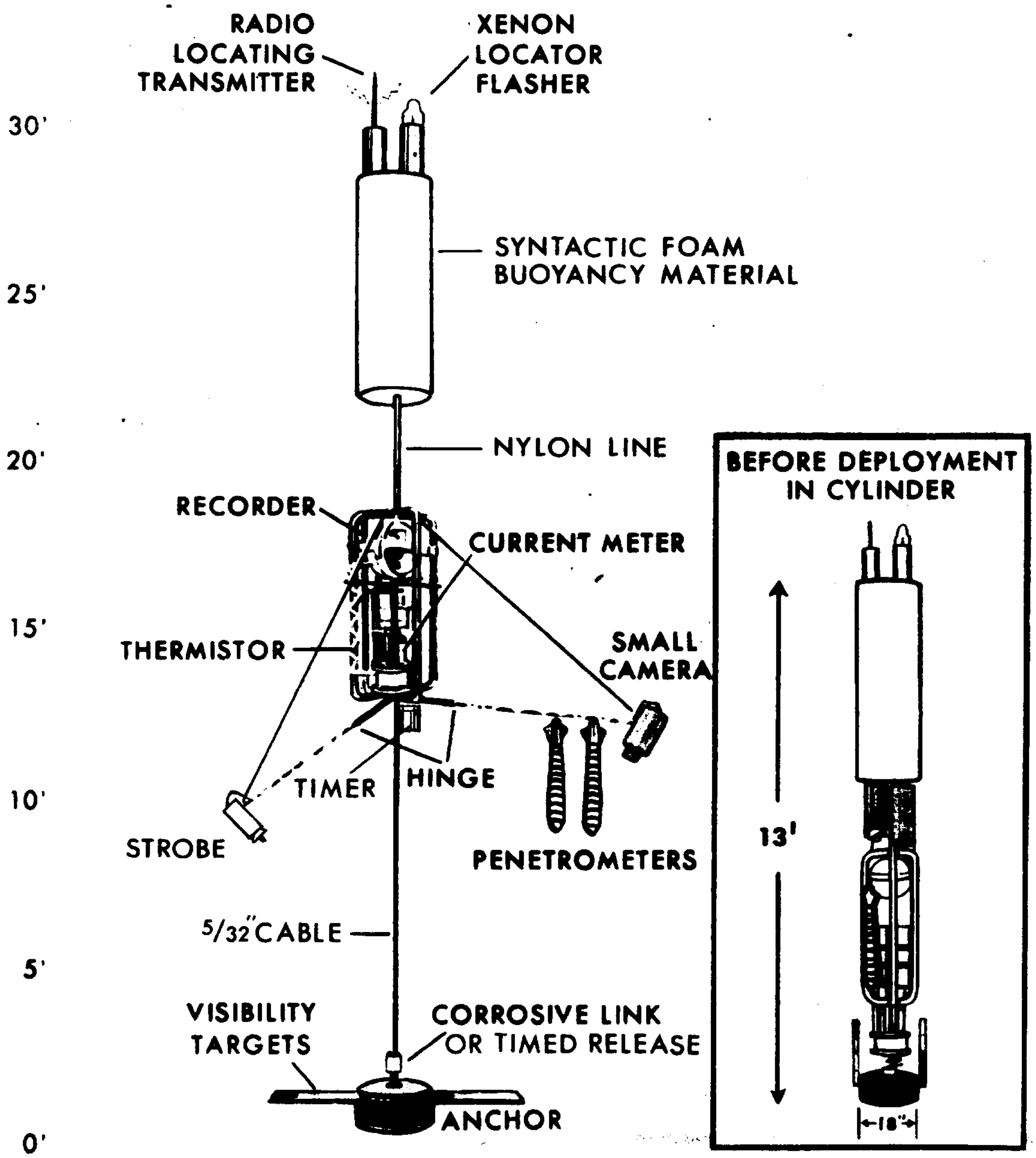
Visibility. Inasmuch as the BESS was planted in only 42 fathoms, the effect of ambient light during the daylight hours is evident (Figure 22). However, the relative maximum/minimum visibility periods can still be determined from the plot. As the densities change with time, it can be stated that visibility in the area is decreasing or increasing due to a change in the volume of backscatterers present in the water mass. The visibility minimums (increase in volume of backscatterers with a corresponding increase in film density) occur at 1915, 2215, 0215, 1215, 1515L. The visibility maximums (decrease in volume of backscatterers) occur at 2015, 0015, 0515, 0915, 1415L. It is interesting to note that the excursions of the visibility plot coincide with the excursions of the current speed and temperature plots. For example, the visibility maximum at 0515L coincides with the current speed maximum of 0.7 knots and very near the temperature maximum of 12.0°C.

Sediment. Figure 23 shows the sea floor, visibility targets, and penetrometers. One of the penetrometers is shown laying on its side which is probably due to its hitting a target rod, rock, or shell fragment on the bottom. The other penetrometer is imbedded about 5" indicating a hard bottom. This was substantiated during coring operations when only short sandy cores were obtained.

Visibility. Inasmuch as the BESS was planted in only 42 fathoms, the effect of ambient light during the daylight hours is evident (Figure 22). However, the relative maximum/minimum visibility periods can still be determined from the plot. As the densities change with time, it can be stated that visibility in the area is decreasing or increasing due to a change in the volume of backscatterers present in the water mass. The visibility minimums (increase in volume of backscatterers with a corresponding increase in film density) occur at 1915, 2215, 0215, 1215, 1515L. The visibility maximums (decrease in volume of backscatterers) occur at 2015, 0015, 0515, 0915, 1415L. It is interesting to note that the excursions of the visibility plot coincide with the excursions of the current speed and temperature plots. For example, the visibility maximum at 0515L coincides with the current speed maximum of 0.7 knots and very near the temperature maximum of 12.0°C.

Sediment. Figure 23 shows the sea floor, visibility targets, and penetrometers. One of the penetrometers is shown laying on its side which is probably due to its hitting a target rod, rock, or shell fragment on the bottom. The other penetrometer is imbedded about 5" indicating a hard bottom. This was substantiated during coring operations when only short sandy cores were obtained.

BOTTOM ENVIRONMENTAL SURVEY PROJECT



BOTTOM ENVIRONMENTAL SENSING SYSTEM

MEASURING VISIBILITY, SEDIMENT STRENGTH, CURRENTS, TEMPERATURE, and TAKING BOTTOM PHOTOGRAPHS

FIGURE 18 BOTTOM ENVIRONMENTAL SENSING SYSTEM

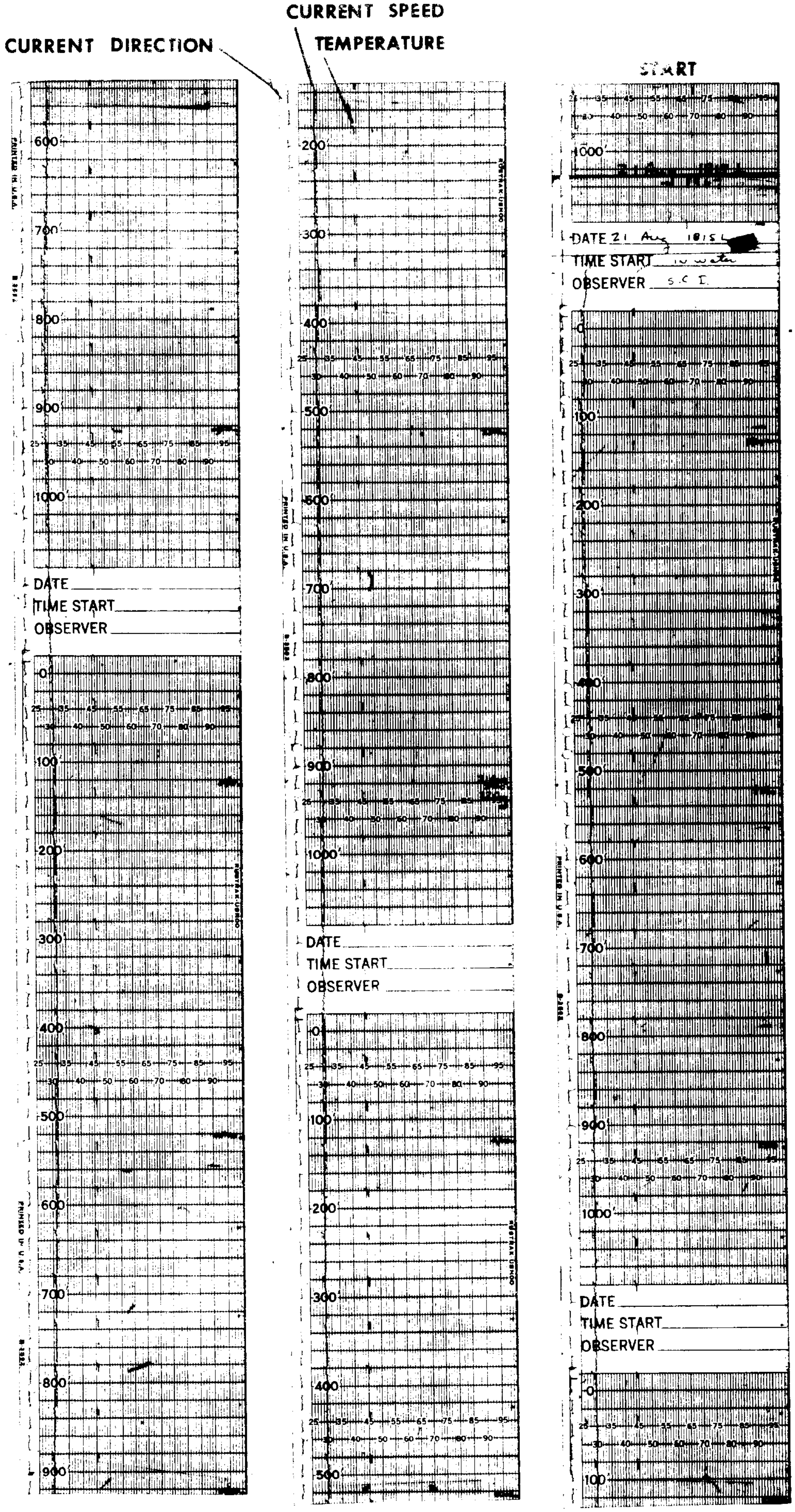


FIGURE 19 CURRENT METER RECORD 21 1815 AUG. TO 22 0600 AUG. 1967

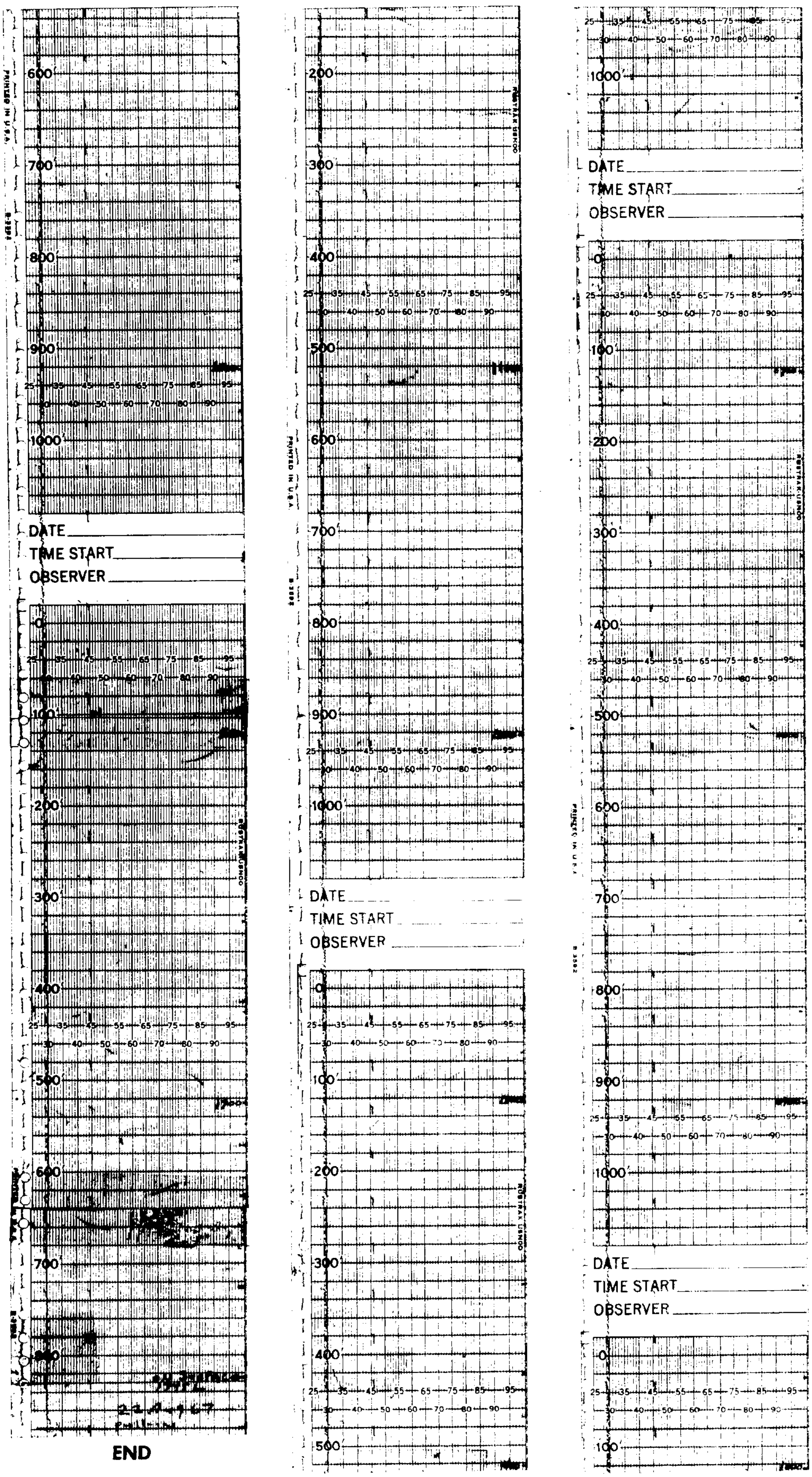


FIGURE 20 CURRENT METER RECORD 22 0600 AUG. TO 22 1745 AUG. 1967

Local Time	Current Speed	Current Direction	Water Temp °C	Local Time	Current Speed	Current Direction	Water Temp °C
21 Aug 67				0600	.50	Vector to	11.0
1815	Equipment	Deployed		0615	.50	North	11.0
1830	Unsettled	Vector to		0630	.50	"	11.0
1845	.50	North	12.0	0645	.50	"	11.0
1900	.40	"	12.0	0700	.40	"	11.0
1915	.30	"	11.5	0715	.40	"	11.0
1930	.50	"	11.5	0730	.40	"	11.5
1945	.50	"	11.5	0745	.40	"	11.5
2000	.50	"	11.5	0800	.40	"	11.5
2015	.50	"	11.5	0815	.40	"	11.5
2030	.50	"	11.0	0830	.40	"	11.5
2045	.50	"	11.0	0845	.40	"	11.5
2100	.50	"	11.0	0900	.45	"	11.5
2015	.50	"	11.0	0915	.50	"	11.5
2030	.50	"	11.0	0930	.50	"	11.5
2045	.50	"	11.0	0945	.50	"	11.5
2200	.50	"	11.0	1000	.50	"	11.5
2215	.50	"	11.0	1015	.50	"	11.0
2230	.60	"	11.0	1030	.50	"	11.0
2245	.60	"	11.0	1045	.50	"	11.0
2300	.60	"	11.0	1100	.50	"	11.0
2315	.60	"	11.0	1115	.50	"	11.0
2330	.60	"	11.0	1130	.45	"	11.0
2345	.60	"	11.0	1145	.45	"	11.0
2400	.60	"	11.0	1200	.45	"	11.0
22 Aug 67				1215	.45	"	11.0
0015	.60	"	11.0	1230	.45	"	11.5
0030	.60	"	11.5	1245	.45	"	11.5
0045	.60	"	11.5	1300	.50	"	11.5
0100	.50	"	11.5	1315	.50	"	11.5
0115	.50	"	11.5	1330	.50	"	11.5
0130	.50	"	11.5	1345	.50	"	11.5
0145	.50	"	11.5	1400	.50	"	11.5
0200	.50	"	11.5	1415	.50	"	11.5
0215	.50	"	11.5	1430	.50	"	11.0
0230	.45	"	11.5	1445	.50	"	11.0
0245	.45	"	11.5	1500	.50	"	11.0
0300	.45	"	12.0	1515	.45	"	11.0
0315	.50	"	12.0	1530	.45	"	11.0
0330	.55	"	12.0	1545	.45	"	11.0
0345	.60	"	12.0	1600	.40	"	11.0
0400	.65	"	12.0	1615	.40	"	11.0
0415	.65	"	12.0	1630	.45	"	11.0
0430	.70	"	11.5	1645	.50	"	11.0
0445	.70	"	11.5	1700	.50	"	11.0
0500	.70	"	11.5	1715	.50	"	11.0
0515	.60	"	11.5	1730	.50	"	11.0
0530	.60	"	11.5	1745	.50	"	11.0
0545	.55	"	11.5	1800	unsettled		

TABLE I. BESS Current Speed and Direction and Water Temperature

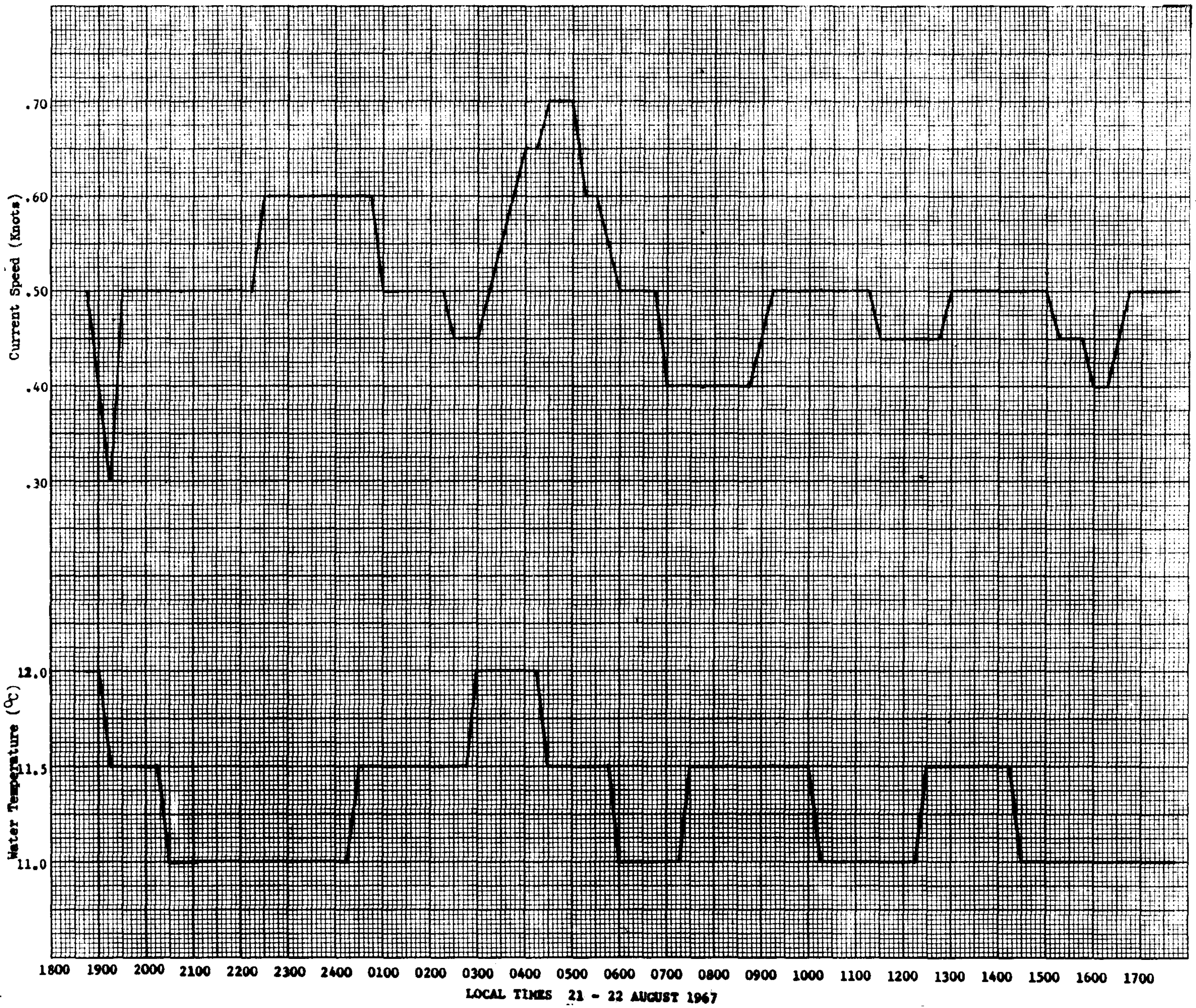


FIGURE 21 CURRENT SPEED AND WATER TEMPERATURE

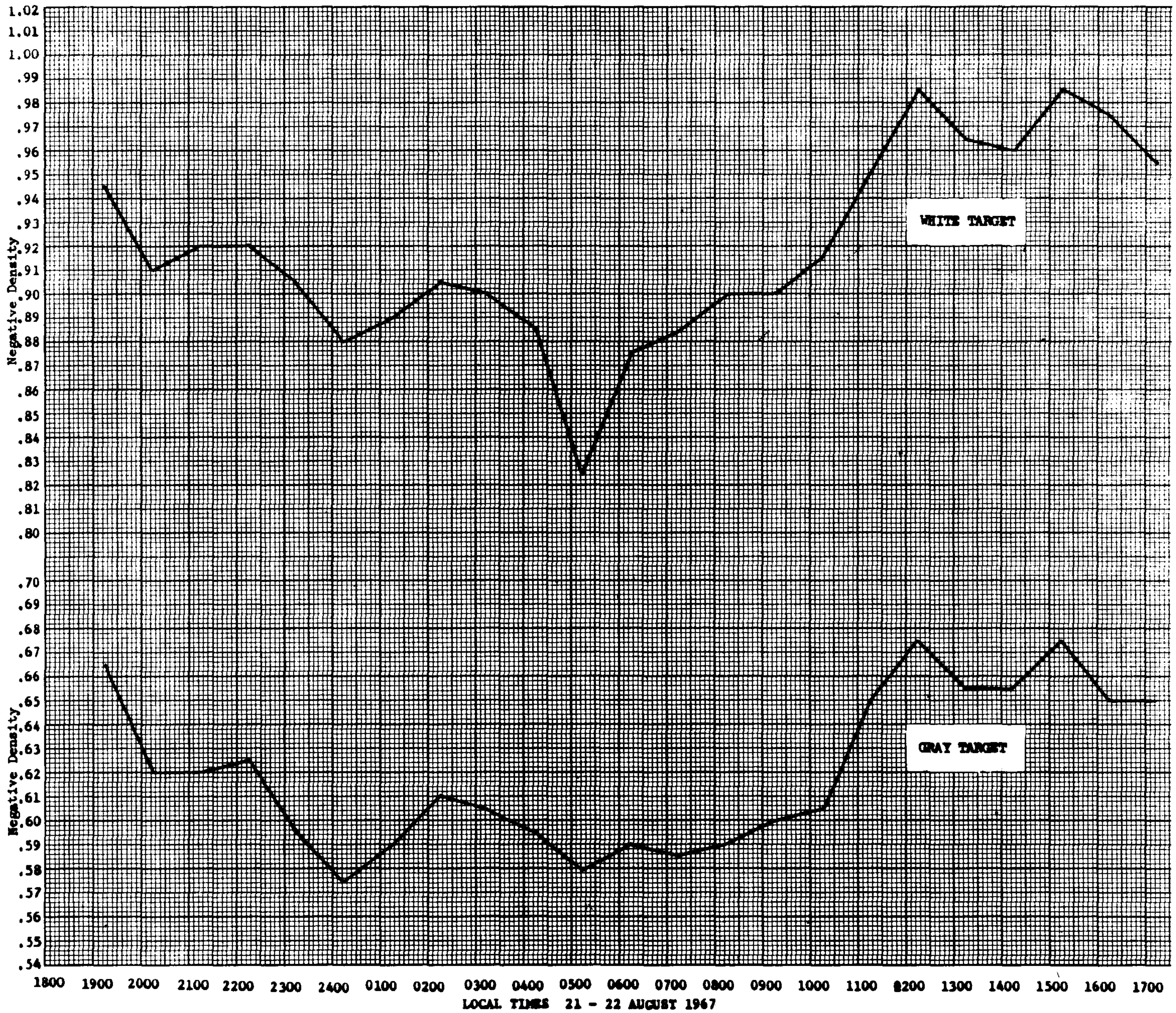


FIGURE 22 DESS TARGET DENSITIES

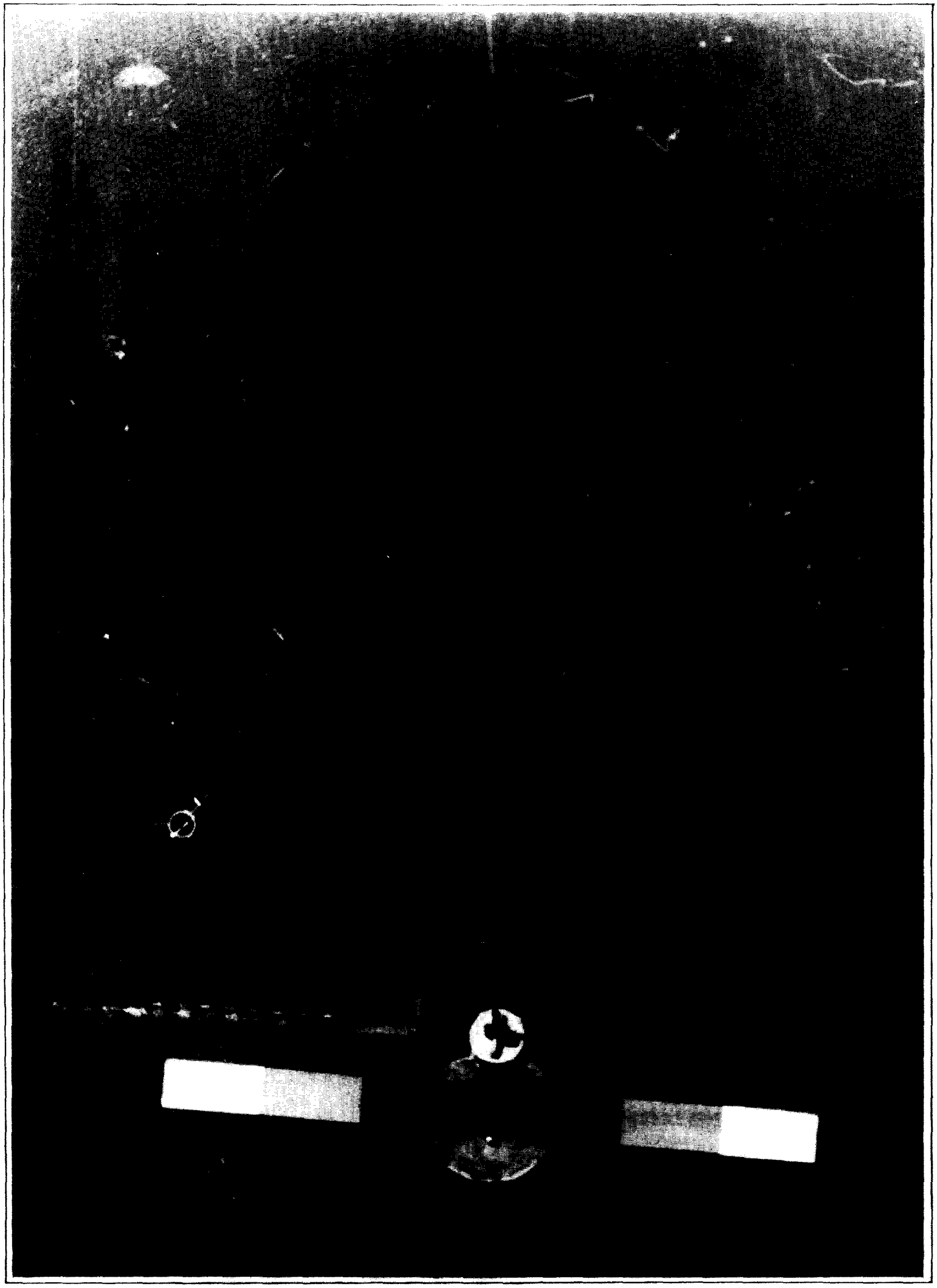


FIGURE 23 PHOTO OF SEA FLOOR VISIBILITY TARGETS AND PENETROMETERS

VII. SEA FLOOR PHOTOGRAPHS OF SEA LAB III AREA

General

Sea floor photographs were obtained in the SEA LAB III area on 5 and 6 July 1967 along the tracks shown in Figure 24. These photographs show a variety of bottom types.

Methods and Procedures

An E.G. &G. Model 204/214 Camera/Strobe System with 35mm Kodak Tri-X film was used to obtain the photographs. This system was mounted on a frame designed to photograph in a plane 30° from the horizontal (Figure 25). This oblique orientation of camera and light source produced a shadow affect which improved the definition of the bottom's smaller features. The addition of fins to the frame made it possible to tow the camera system along the desired tracks. The DAVIS was navigated by Randall Radar on San Clemente Island.

Analysis and Results

Quasi-photo mosaics of the SEA LAB III area sea floor are shown in Figures 26 through 29. The bottom is alternately smooth and flat, steep, and boulder strewn. There was insufficient time during the survey to obtain sufficient bottom photographs to make a reasonably complete pictorial presentation of the bottom. Additional photographic runs should be made before a detailed chart depicting the sea floor characteristics of the SEA LAB III area can be constructed.

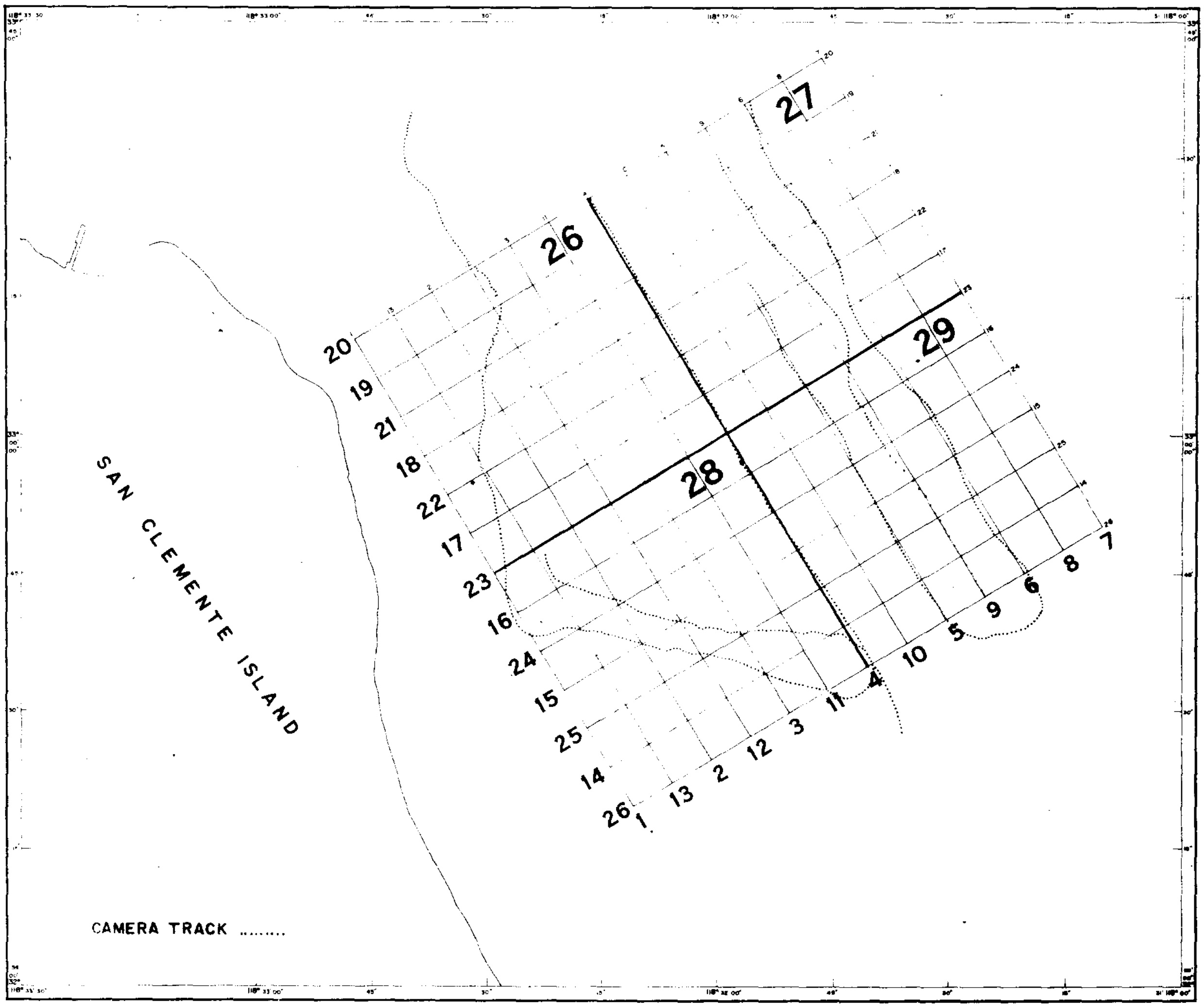


FIGURE 24 LOCATIONS OF SEA FLOOR PHOTOGRAPHS AND QUASI-MOSAIC SHEET INDEX

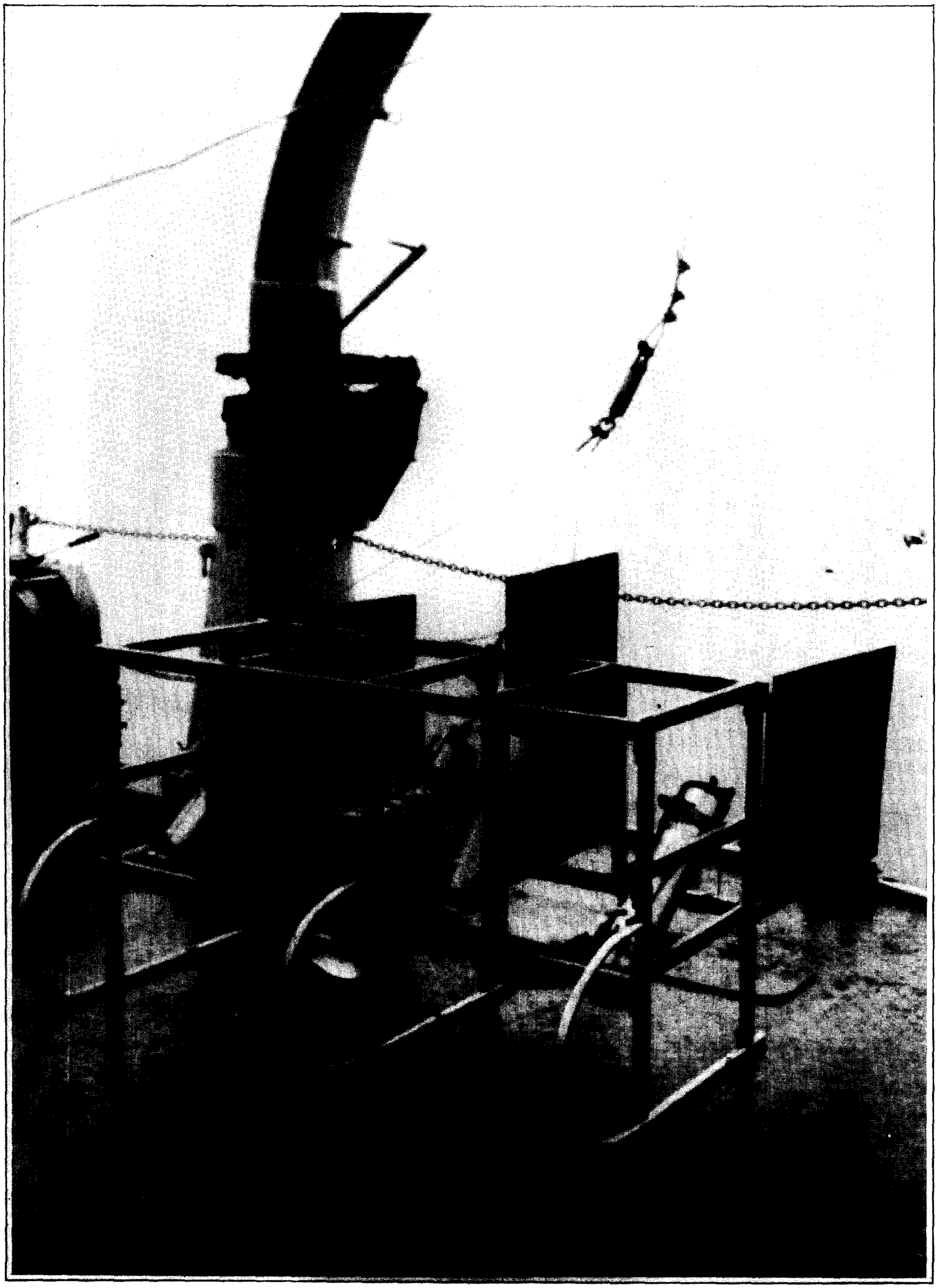


FIGURE 25 OBLIQUE CAMERA SYSTEM

VIII. REFERENCES

1. OSER, R., BERGER, J., and FRANC, L.: "Oceanographic Data Report, San Clemente Island Area, October to December 1966;" IR No.67-77. U.S. Naval Oceanographic Office, Washington, D.C. 1967. 152p.

2. FAGOT, M. and OSER, R.: "Deep-Towed Bathymetric System;" IM No. 67-12. U. S. Naval Oceanographic Office, Washington, D. C. 1967. 14 p.

3. KRUMBEIN, W.C. and PETTIJOHN, F.J.: "Manual of Sedimentary Petrography;" Appelton, Century, Crofts, Inc., New York. 1938. 549 p.

4. U. S. NAVY HYDROGRAPHIC OFFICE: "Instruction Manual for Oceanographic Observation;" 2nd ed., Pub. 607. U. S. Navy Hydrographic Office, Washington, D. C. 1955. 210p.

5. OSER, R. and FAGOT, M.: "Design and Use of a Bottom Environmental Sensing System;" IR No. 67-74. U. S. Naval Oceanographic Office, Washington, D. C. 1967. 14 p.

APPENDIX A

BOTTOM SAMPLE LOG SHEETS

OCEANOGRAPHIC LOG SHEET-R
NAVOCEANO-EXP-3167/18 (Rev.1-63)

GRAB SAMPLE ANALYSIS SUMMARY SHEET
SEDIMENT SIZE AND COMPOSITION

ANALYZED BY J.B. Coleman

DATE 10 Oct 1967

CRUISE NO. SEALAB III San Clemente

1. DATE TAKEN (Day, Mo., Yr.)	5/7/67	5/7/67	5/7/67	5/7/67				
2. SAMPLE NO.	BS-1	BS-2	BS-3	BS-4				
3. LABORATORY NO.	P4-1	P4-2	P4-3	P4-4				
4. LATITUDE	32°59'39"	same	same	33°00'30"				
5. LONGITUDE	118°32'06"	same	same	118°31'48'				
6. WATER DEPTH (m)	88	88	88	302				
7. TYPE SAMPLER	Kullenberg	Kullenberg	Kullenberg	Nansen				
8. COLOR (GSA Rock Color Charts) ☑ FIELD ☐ LAB DETERMINATION	5Y 4/2 f	5Y 4/2- 5Y 7/2 f	5Y 7/2 f	5Y 3/1 f	☐	☐	☐	☐
9. ODOR								
10. SIZE & COMPOSITION ANALYSIS								
a. > 4mm mm (%)	3 (shells)	2 (shells)		3 (rocks)				
b. 4 to 2 mm (%)	7	2	5	15				
c. 2 to 1 mm (%)	13	4	6	9				
d. 1 to .500 mm (%)	13	10	8	9				
e. .500 to .250 mm (%)	27	34	27	17				
f. .250 to .125 mm (%)	28	38	37	30				
g. .125 to .062 mm (%)	8	9	13	15				
h. .062 to .031 mm (%)								
i. .031 to .016 mm (%)	3	2	3	5				
j. .016 to .008 mm (%)								
k. .008 to .004 mm (%)	trace	trace	trace	trace				
l. .004 to .002 mm (%)								
m. .002 to .001 mm (%)								
n. < .001 mm (%)								
o. Median Diameter (mm)		0.2553	0.2300	0.2500				
p. Sorting Coefficient		1.54	1.68	2.57				
q. Skewness		1.086	1.182	2.159				
r. Standard Deviation (mm)								
s. Sediment Type		sand						
t. Dominant Minerals (%)	Calcium Carbonate	Calcium Carbonate	Calcium Carbonate	Calcium Carbonate				
u. Secondary Minerals (%)	Quartz	Quartz	Quartz	Quartz Volcanies				
v. Calcium Carbonate (%)								
w. Organic Carbon (%)								

11. REMARKS BS-4 Obtained in Nansen Bottle on Cast #5.

LOCATION: SEA LAB III, San Clemente Island DATE LOGGED: 16 July 1967

	LAB NO.	COLOR	SEDIMENT TYPE	REMARKS
SAMPLE NO: 1 LAT: 32°59'39" LONG: 118°32'06" DATE: 5/7/67 WATER DEPTH: 88m	P4-1	light olive gray 5Y4/2	shelly sand	medium to coarse subangular sand 80% calcareous, Forams, Globes, algae, Bryozoa, Pelecypods; 20% medium to coarse, subangular to angular to rounded quartz.
SAMPLE NO: 2 LAT: same LONG: position DATE: 5/7/67 WATER DEPTH: 88m	P4-2	lt olive gray to yellow gray. 5Y4/2-5Y7/2	shelly-sand	fine to coarse subangular sand. 80-90% shells, Pelecypods, Bryozoa, Forams, algae. 10-20% quartz and feldspar. trace of silt, clay, and volcanics.
SAMPLE NO: 3 LAT: same LONG: position DATE: 5/7/67 WATER DEPTH: 88m	P4-3	lt yellowish gray 5Y7/2	shelly sand	medium to coarse, subangular sand. 80% calcareous Forams, Bryozoa, algae, Pelecypod fragments. 10% quartz xtals. 10% hornblend and volcanics.
SAMPLE NO: 4 LAT: 33°00'30" LONG: 118°31'48" DATE: 7/7/67 WATER DEPTH: 302m	P4-4	olive gray 5Y3/1	calcareous sand	medium to coarse sand, contains Forams, shell fragments, volcanic breccia material. pink stain.
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				
SAMPLE NO: LAT: LONG: DATE: WATER DEPTH:				

APPENDIX B

NANSEN CAST LISTINGS

REFERENCE CTRY CODE	REFERENCE ID. NO.	SHIP CODE	LATITUDE ° 1/10	LONGITUDE ° '1/10	DRIFT INDCTR	MARSDEN SQUARE 10°	MARSDEN SQUARE 1°	STATION TIME (GMT) MO	DAY	HR.1/10	YEAR	ORIGINATOR'S CRUISE NO.	ORIGINATOR'S STATION NUMBER	DEPTH TO BOTTOM	MAX. DEPTH OF S'MPL'S	WAVE OBSERVATIONS DIR.	HGT	PER	SEA	WEATHER CODE	CLOUD CODES TYPE	AMT		NODC STATION NUMBER
31	088	CD	32599N	118322W		120	28	07	07	084	1967	711	1	0135	01	00	0			X1	7	4		0002

WATER COLOR CODE	WATER TRANS. (m)	WIND DIR.	WIND SPEED OR FORCE	BARO-METER (mbs)	AIR TEMP. °C DRY BULB	AIR TEMP. °C WET BULB	VIS. CODE	NO. OBS. DEPTHS	SPECIAL OBSERVATIONS
		00	S00	15	169	161	7		

MESSENGR TIME or HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY-X10^7	Σ Δ D DYN. M. X 10^3	SOUND VELOCITY	O2 ml/l	PO4-P µg-at/l	TOTAL-P µg-at/l	NO2-N µg-at/l	NO3-N µg-at/l	SiO4-Si µg-at/l	pH	SCC
		STD	0000	1846	3343	2398	0039400	0000	15160								
084		OBS	0000	1846	3343	2398			15160								
		STD	0010	1795	3340	2408	0038456	0039	15146								
		STD	0020	1712	3338	2426	0036735	0077	15123								
084		OBS	0020	1712	3338	2426			15123								
		STD	0030	1559	3336	2460	0033566	0112	15077								
084		OBS	0045	1362	3335	2501			15016								
		STD	0050	1302	3336	2514	0028490	0174	14997								
084		OBS	0070	1122	3338	2550			14938								
		STD	0075	1103	3339	2554	0024711	0240	14933								
084		OBS	0090	1038	3348	2572			14913								
		STD	0100	0988	3359	2589	0021379	0298	14898								
084		OBS	0100	0988	3359	2589			14898								
084		OBS	0105	0964	3367	2599			14891								
084		OBS	0110	0947	3372	2606			14886								
084		OBS	0115	0941	3375	2609			14885								
084		OBS	0120	0932	3376	2612			14883								
		STD	0125	0924	3379	2615	0018937	0348	14881								
084		OBS	0125	0924	3379	2615			14881								
084		OBS	T0130	0902	3383	2622			14874								

REFERENCE CTRY CODE	REFERENCE ID. NO.	SHIP CODE	LATITUDE ° 1/10	LONGITUDE ° '1/10	DRIFT INDCTR	MARSDEN SQUARE 10°	MARSDEN SQUARE 1°	STATION TIME (GMT) MO	DAY	HR. 1/10	YEAR	ORIGINATOR'S CRUISE NO.	ORIGINATOR'S STATION NUMBER	DEPTH TO BOTTOM	MAX. DEPTH OF S'MPL'S	WAVE OBSERVATIONS DIR.	HGT	PER	SEA	WEATHER CODE	CLOUD CODES TYPE	AMT		NODC STATION NUMBER
31	1088	CD	32598N	118319W		120	28	07	07	097	1967	711	2	0177	02	00	0			X2	7	8		0003

WATER COLOR CODE	WATER TRANS. (m)	WIND DIR.	WIND SPEED OR FORCE	BAROMETER (mbs)	AIR TEMP. °C DRY BULB	AIR TEMP. °C WET BULB	VIS. CODE	NO. OBS. DEPTHS	SPECIAL OBSERVATIONS
		00	S00	15	167	158	7		

MESSENGR TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY-X10^7	Σ Δ D DYN. M. X 10^3	SOUND VELOCITY	O2 ml/l	PO4-P µg-at/l	TOTAL-P µg-at/l	NO2-N µg-at/l	NO3-N µg-at/l	SiO4-Si µg-at/l	pH	SCC
097		OBS	0124		3376												
		STD	0125		3377												
097		OBS	0129	0920	3379	2616			14880								
097		OBS	0134	0896	3386	2625			14873								
097		OBS	0139	0892	3386	2626			14872								
097		OBS	0144	0890	3387	2627			14872								
097		OBS	0149	0882	3389	2630			14870								
		STD	0150	0882	3389	2630	0017584		14870								
097		OBS	0154	0879	3390	2631			14870								
097		OBS	T0159	0864	3391	2634			14865								
097		OBS	0163	0858	3393	2637			14864								
097		OBS	0168	0858	3393	2637			14865								
097		OBS	0173	0859	3394	2637			14866								
097		OBS	T0178	0842	3394	2640			14860								

REFERENCE CTRY CODE	REFERENCE ID. NO.	SHIP CODE	LATITUDE ° 1/10	LONGITUDE ° 1/10	DRIFT INDCTR	MARSDEN SQUARE 10°	MARSDEN SQUARE 1°	STATION TIME (GMT) MO	DAY	HR. 1/10	YEAR	ORIGINATOR'S CRUISE NO.	ORIGINATOR'S STATION NUMBER	DEPTH TO BOTTOM	MAX. DEPTH OF S'MPL'S	WAVE OBSERVATIONS DIR.	HGT	PER	SEA	WEATHER CODE	CLOUD CODES TYPE	AMT		NODC STATION NUMBER
31	088	CD	33001N	118319W		120	28	07	07	109	1967	711	3	0293	03	00	0			X2	7	8		0004

WATER COLOR CODE	WATER TRANS. (m)	WIND DIR.	WIND SPEED OR FORCE	BAROMETER (mbs)	AIR TEMP. °C DRY BULB	AIR TEMP. °C WET BULB	VIS. CODE	NO. OBS. DEPTHS	SPECIAL OBSERVATIONS
		00	500	148	164	156	7		

MESSENGR TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY-X10^7	Σ Δ D DYN. M. X 10^3	SOUND VELOCITY	O_2 ml/l	PO_4-P μg-at/l	TOTAL-P μg-at/l	NO_2-N μg-at/l	NO_3-N μg-at/l	SiO_4-Si μg-at/l	pH	SCC
109		OBS	0045	1204	3335	2532			14963								
		STD	0050	1182	3338	2539	0026109		14956								
		STD	0075	1082	3350	2566	0023543		14927								
109		OBS	0095	1017	3359	2584			14907								
		STD	0100	1005	3361	2588	0021506		14904								
		STD	0125	0951	3372	2606	0019877		14890								
109		OBS	0145	0913	3380	2618			14880								
		STD	0150	0904	3382	2621	0018453		14878								
109		OBS	0195	0835	3398	2644			14861								
		STD	0200	0830	3399	2645	0016199		14860								
109		OBS	0245	0792	3404	2655			14854								
		STD	0250	0790	3405	2656	0015225		14854								
109		OBS	0255	0786	3406	2658			14853								
109		OBS	0265	0772	3406	2660			14850								
109		OBS	T0275	0764	3408	2663			14848								
109		OBS	0280	0752	3410	2666			14845								
109		OBS	0285	0752	3410	2666			14846								
109		OBS	T0290	0740	3410	2668			14842								
109		OBS	T0295	0735	3410	2668			14841								

REFERENCE CTRY CODE	REFERENCE ID. NO.	SHIP CODE	LATITUDE ° 1/10	LONGITUDE ° '1/10	DRIFT INDCTR	MARSDEN SQUARE 10°	MARSDEN SQUARE 1°	STATION TIME (GMT) MO	STATION TIME (GMT) DAY	STATION TIME (GMT) HR.1/10	YEAR	ORIGINATOR'S CRUISE NO.	ORIGINATOR'S STATION NUMBER	DEPTH TO BOTTOM	MAX. DEPTH OF S'MPL'S	WAVE OBSERVATIONS DIR.	WAVE OBSERVATIONS HGT	WAVE OBSERVATIONS PER	WAVE OBSERVATIONS SEA	WEA-THER CODE	CLOUD CODES TYPE	CLOUD CODES AMT		NODC STATION NUMBER
31	088	CD	32597N	118317W		120	28	07	07	122	1967	711	4	01654	02	00	0			X2	7	8		0005

WATER COLOR CODE	WATER TRANS. (m)	WIND DIR.	WIND SPEED OR FORCE	BARO-METER (mbs)	AIR TEMP. °C DRY BULB	AIR TEMP. °C WET BULB	VIS. CODE	NO. OBS. DEPTHS	SPECIAL OBSERVATIONS
		00	S00	147	167	158	8		

MESSENGR TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY-X10⁷	Σ Δ D DYN. M. X 10³	SOUND VELOCITY	O₂ ml/l	PO₄-P µg-at/l	TOTAL-P µg-at/l	NO₂-N µg-at/l	NO₃-N µg-at/l	SiO₄-Si µg-at/l	pH	SCC
122		OBS	0097	0986	3363	2593			14897								
		STD	0100	0977	3365	2596	0020759		14894								
122		OBS	0117	0938	3373	2608			14884								
		STD	0125	0928	3376	2612	0019221		14882								
122		OBS	0132	0918	3378	2616			14880								
		STD	0150	0889	3385	2626	0018001		14873								
122		OBS	0167	0866	3391	2634			14867								
122		OBS	0187	0844	3397	2642			14863								
122		OBS	0197	0834	3397	2644			14861								
		STD	0200	0833	3398	2644	0016323		14861								
122		OBS	0202	0833	3398	2644			14862								
122		OBS	0207	0832	3398	2645			14862								
122		OBS	T0212	0822	3398	2646			14859								
122		OBS	0217	0814	3401	2650			14857								
122		OBS	0222	0808	3402	2651			14856								
122		OBS	T0227	0797	3403	2654			14853								

CTRY CODE	ID. NO.	SHIP CODE	LATITUDE ° 1/10	LONGITUDE ° '1/10	DRIFT INDCTR	MARSDEN SQUARE 10°	MARSDEN SQUARE 1°	STATION TIME (GMT) MO	DAY	HR. 1/10	YEAR	ORIGINATOR'S CRUISE NO.	ORIGINATOR'S STATION NUMBER	DEPTH TO BOTTOM	MAX. DEPTH OF S'MPL'S	WAVE OBSERVATIONS DIR.	HGT	PER	SEA	WEATHER CODE	CLOUD CODES TYPE	AMT		NODC STATION NUMBER
31	1088	CD	33005N	118318W		120	38	07	07	137	1967	711	5	0302+	04	11	0			X2	7	8		0006

WATER COLOR CODE	WATER TRANS. (m)	WIND DIR.	WIND SPEED OR FORCE	BAROMETER (mbs)	AIR TEMP. °C DRY BULB	AIR TEMP. °C WET BULB	VIS. CODE	NO. OBS. DEPTHS	SPECIAL OBSERVATIONS
		11	S02	145	164	156	8		

MESSENGR TIME HR 1/10	CAST NO.	CARD TYPE	DEPTH (m)	T °C	S ‰	SIGMA-T	SPECIFIC VOLUME ANOMALY-X10⁷	ΣΔD DYN. M. X 10³	SOUND VELOCITY	O2 ml/l	PO4-P µg-at/l	TOTAL-P µg-at/l	NO2-N µg-at/l	NO3-N µg-at/l	SiO4-Si µg-at/l	pH	SCC
137		OBS	0060	1115	3338	2551			14934								
		STD	0075	1060	3350	2570	0023173		14919								
		STD	0100	0983	3367	2596	0020707		14897								
137		OBS	0110	0958	3372	2604			14890								
		STD	0125	0931	3377	2613	0019194		14883								
		STD	0150	0891	3385	2625	0018032		14873								
137		OBS	0160	0876	3388	2630			14870								
		STD	0200	0824	3396	2644	0016303		14858								
137		OBS	0210	0813	3398	2647			14855								
		STD	0250	0778	3405	2658	0015052		14849								
137		OBS	0260	0770	3406	2660			14848								
		STD	0300	0741	3409	2667	0014311		14844								
137		OBS	0310	0730	3410	2669			14841								
137		OBS	0330	0703	3413	2675			14834								
137		OBS	T0340	0692	3414	2677			14832								
137		OBS	T0345	0686	3414	2678			14830								
137		OBS	0350	0684	3414	2678			14830								
137		OBS	T0355	0682	3414	2679			14830								
137		OBS	0360	0688Q	3414	2678Q											

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U.S. Naval Oceanographic Office Washington, D.C. 20390	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

Oceanographic Data Report, San Clemente Island Area, July and August 1967

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Informal Report

5. AUTHOR(S) (First name, middle initial, last name)

Albert R. Mooney
Robert K. Oser

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1968	43 & four foldouts	5

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 771	I.R. No. 68-20
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
This report is a supplement to I.R.67-77	U.S. Naval Oceanographic Office

13. ABSTRACT

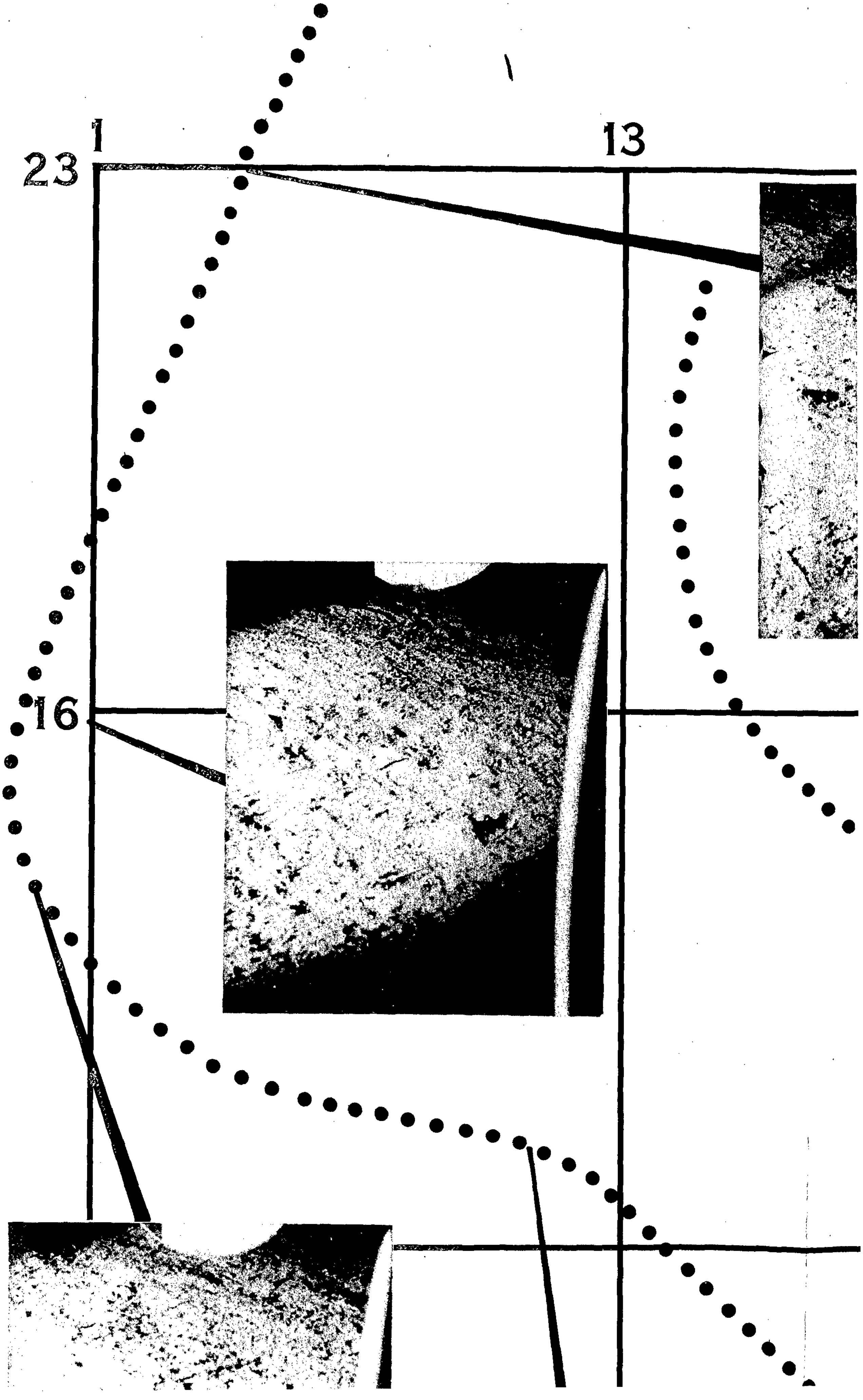
This report presents oceanographic data collected during July and August 1967 aboard the USNS DAVIS (T-AGOR 5) in the San Clemente Island Deep Submergence Rescue Vehicle Test Range and SEA LAB III areas. The Deep-Towed Profiler records show two small valleys in the SEA LAB III area. The bottom's surface was predominately sand at the sites sampled. Nansen cast data show that the water column temperature decreases almost linearly below the thermocline. Although current speeds of 0.5 knots were recorded at the 100 and 260 fathom sites, the predominant current speeds varied from 0.0 to 0.2 knots. The near-bottom current at the 42 fathom site reached 0.7 knots with a mean speed of 0.5 knots. The current direction at the sites sampled reverses along an axis parallel to San Clemente Island. Bottom photographs show that the bottom is alternately smooth and flat, steep, and boulder strewn.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6801

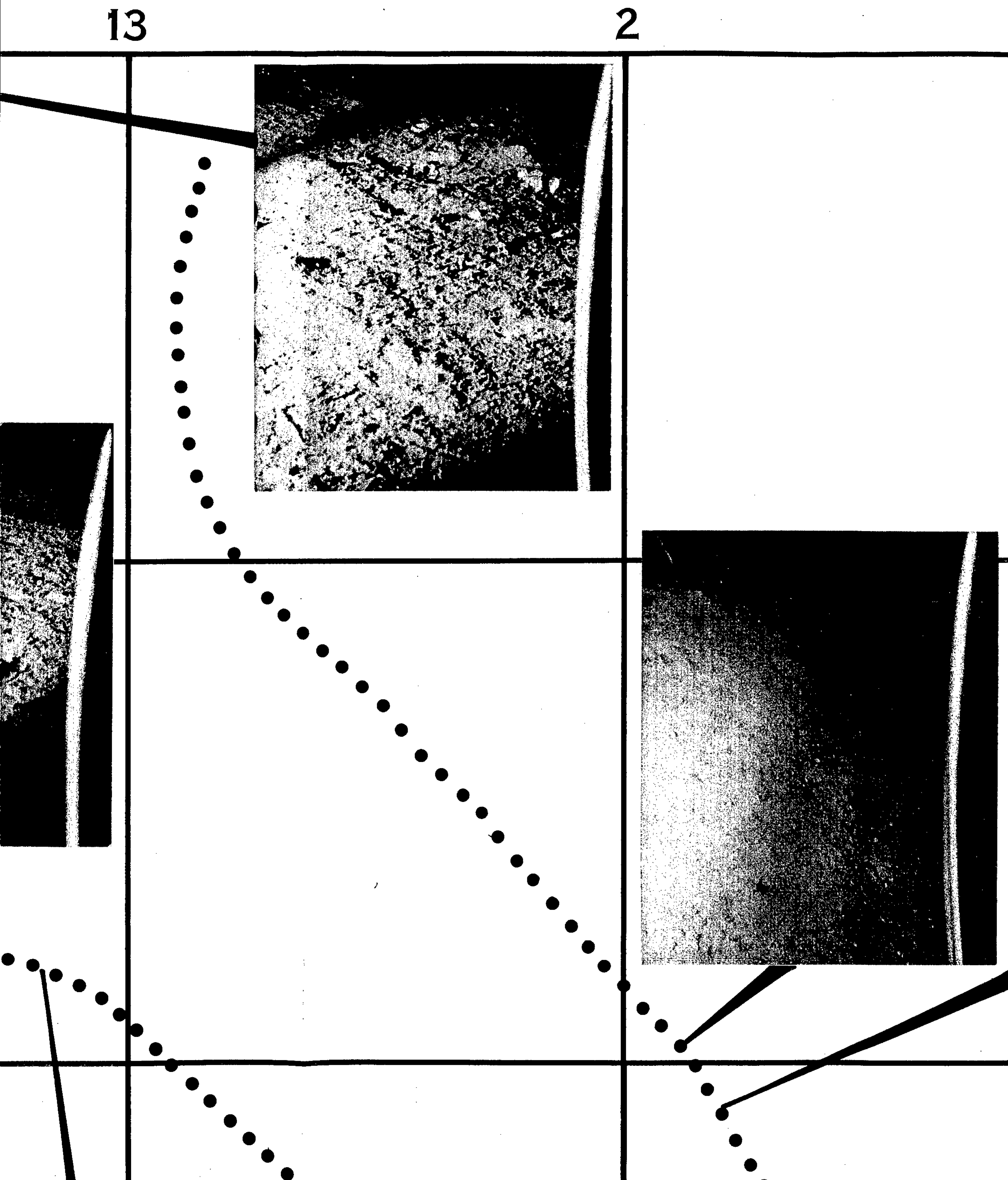
UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
San Clemente Island Area						
Sea Lab III Area Oceanography						
DSRV Test Area Oceanography						

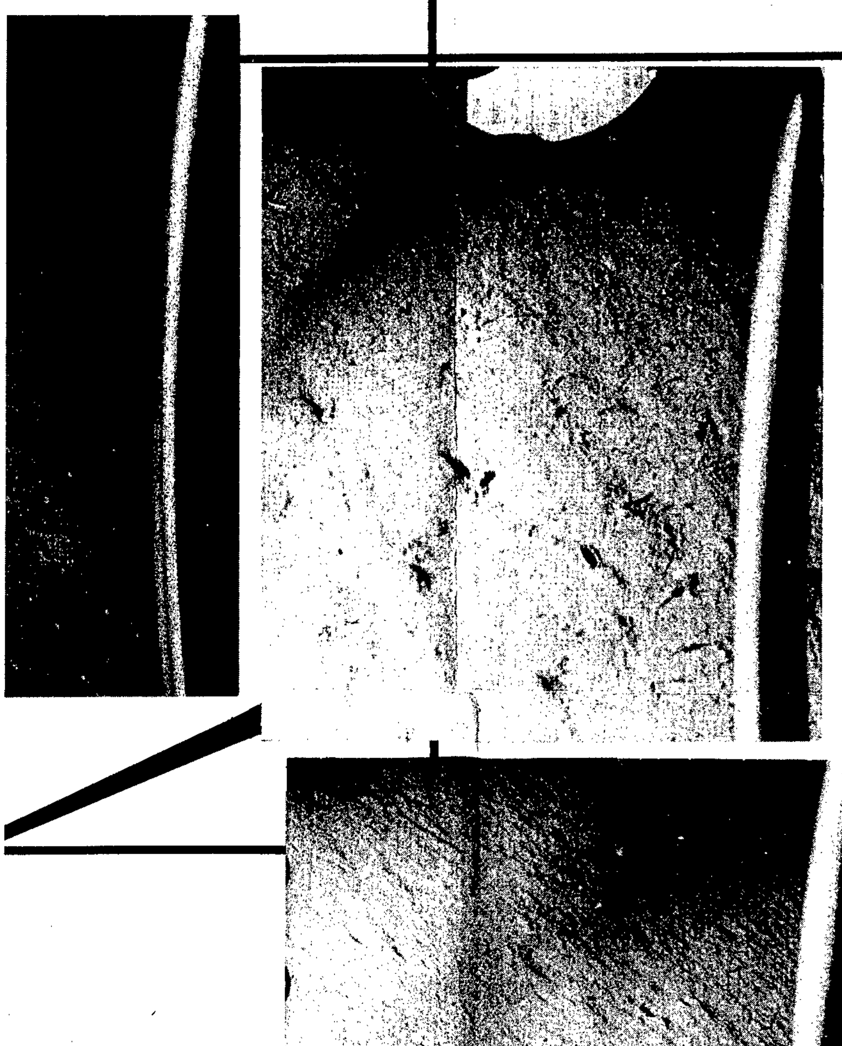


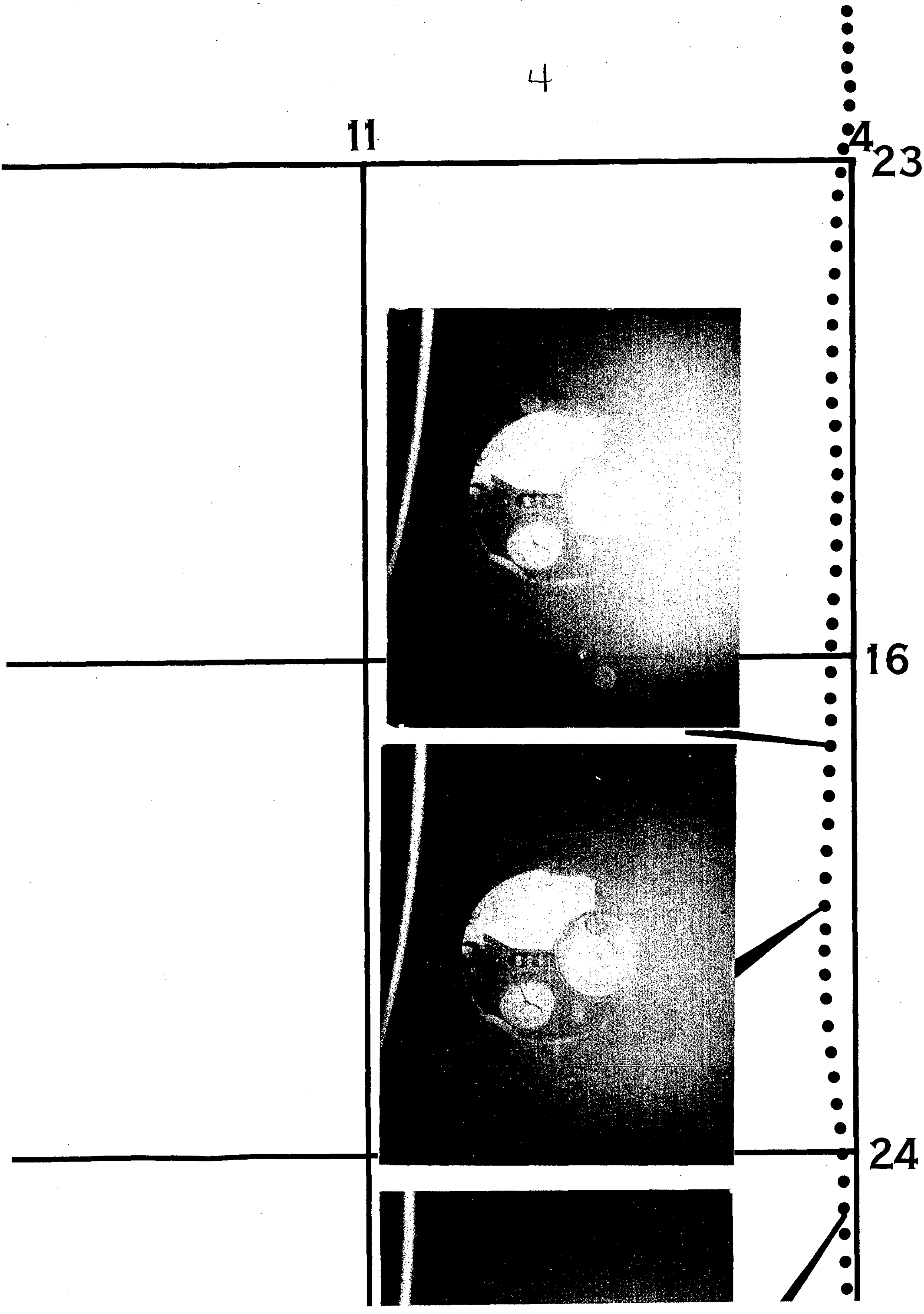
23
1
13
16

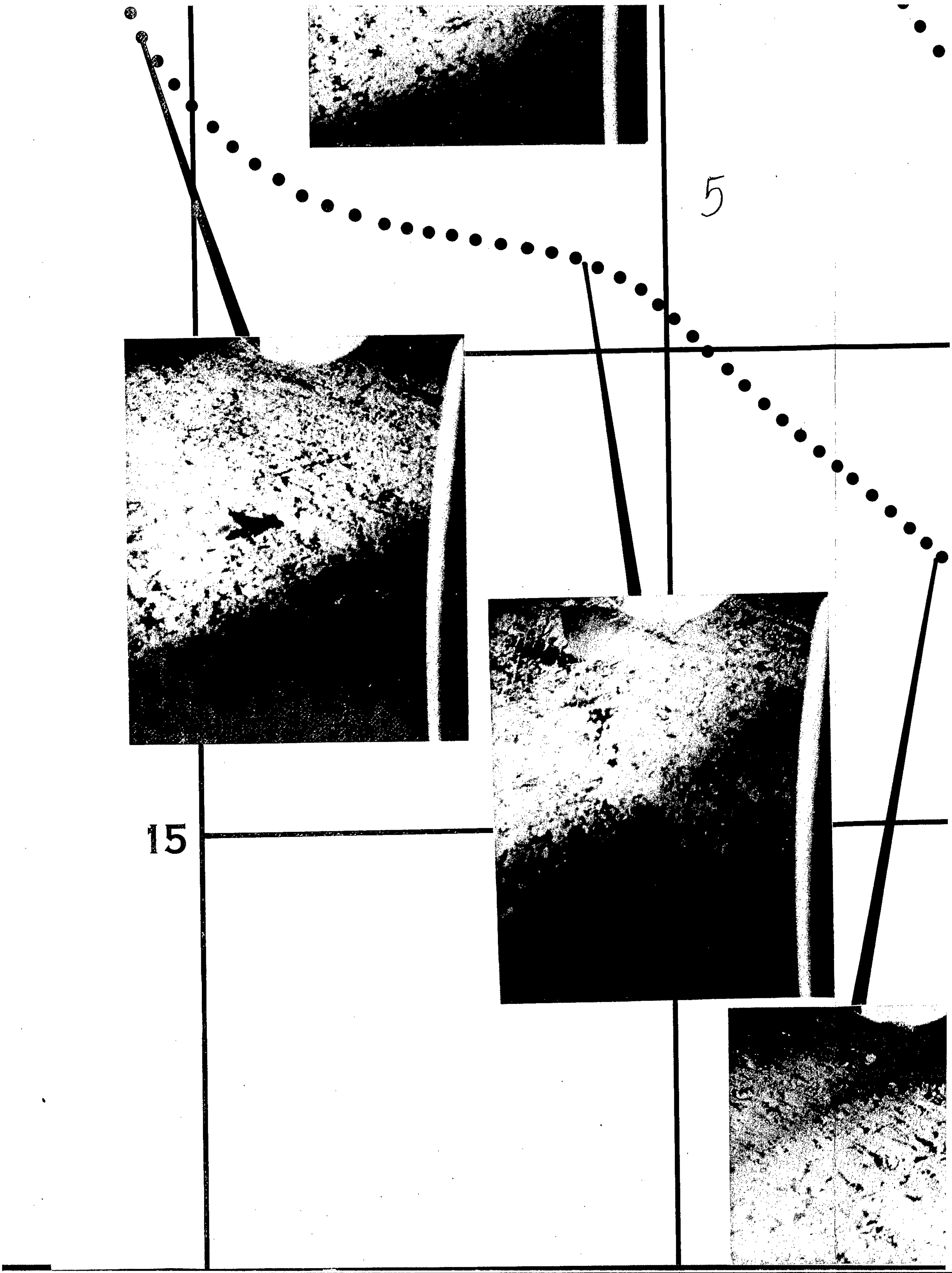
2

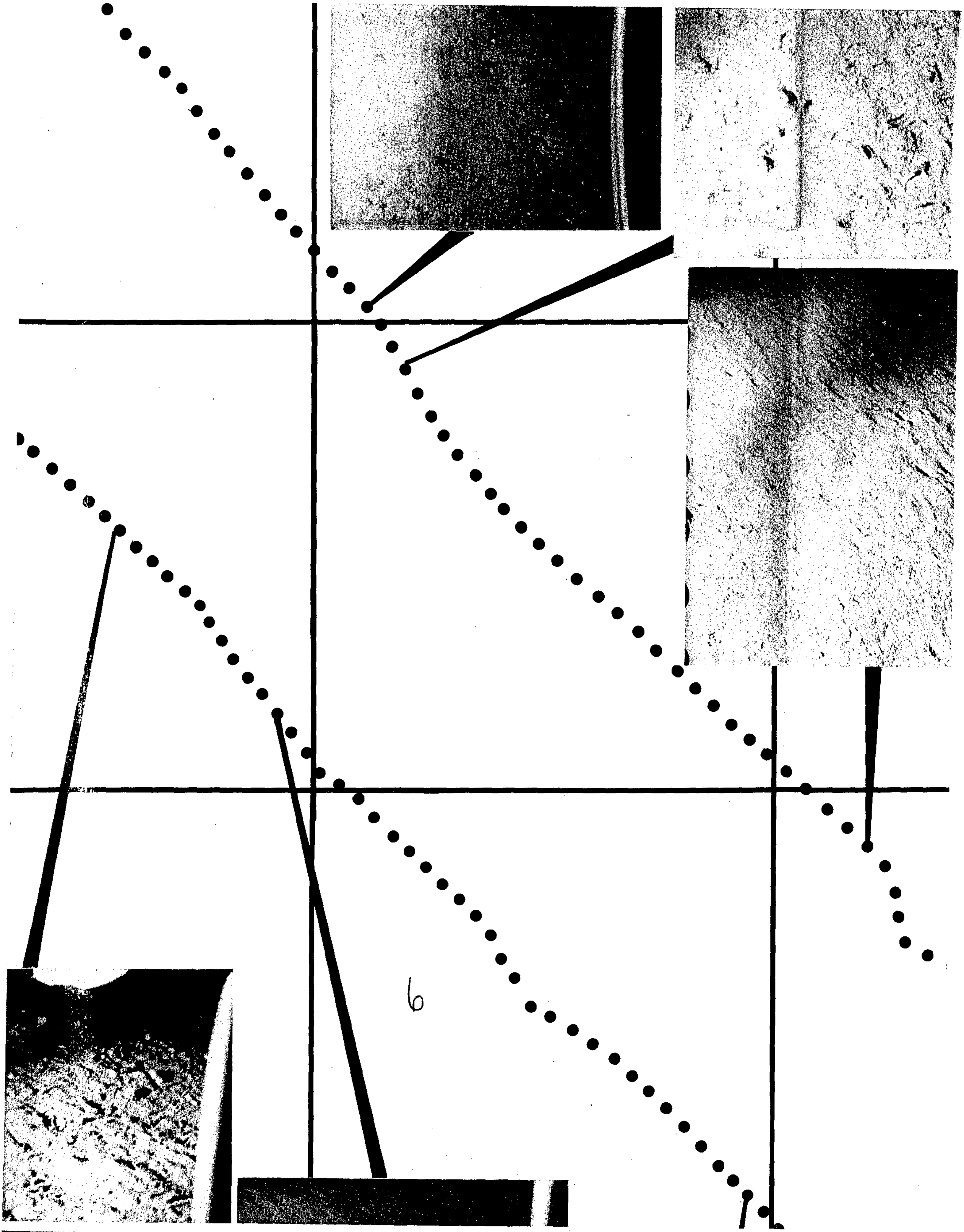


12 3

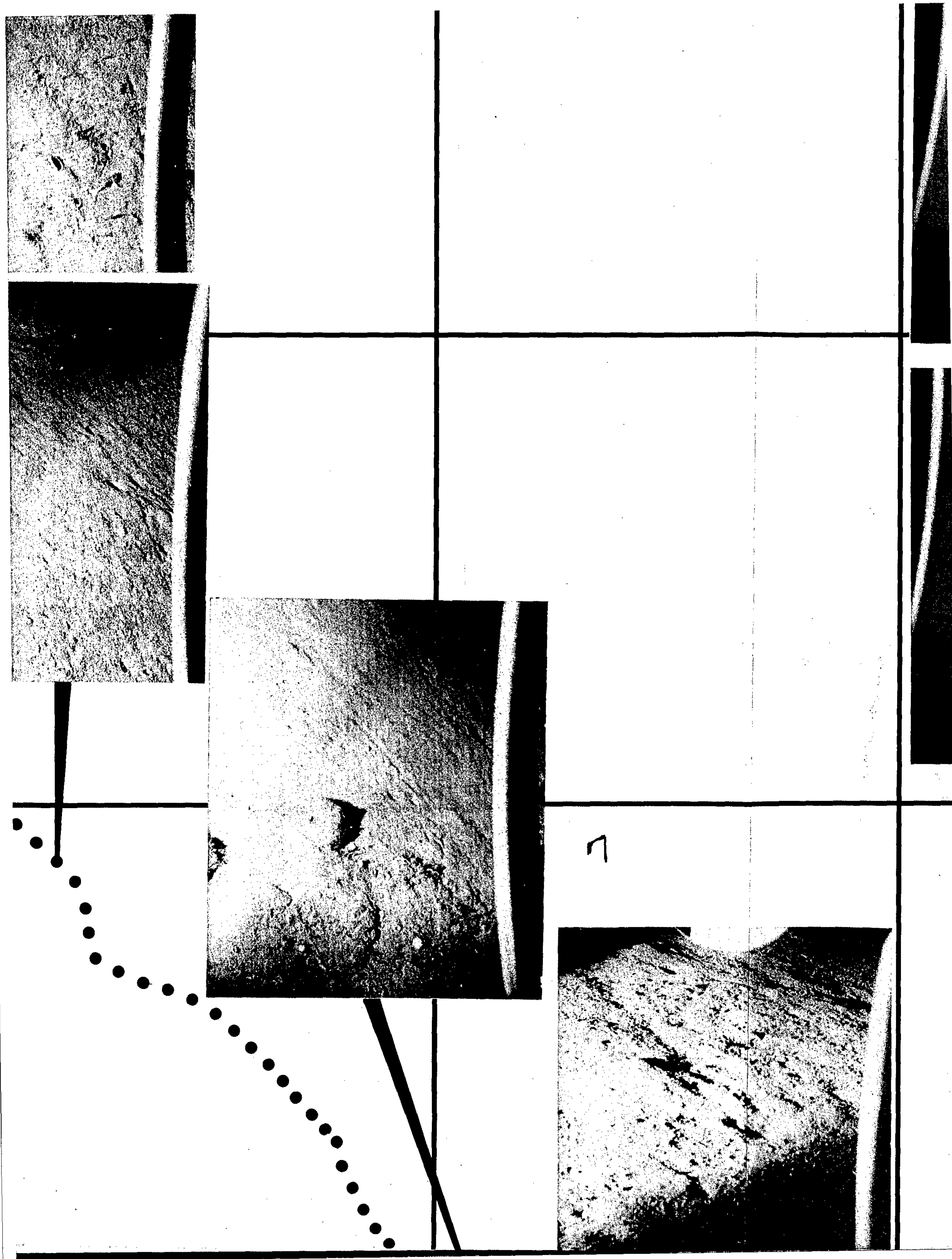


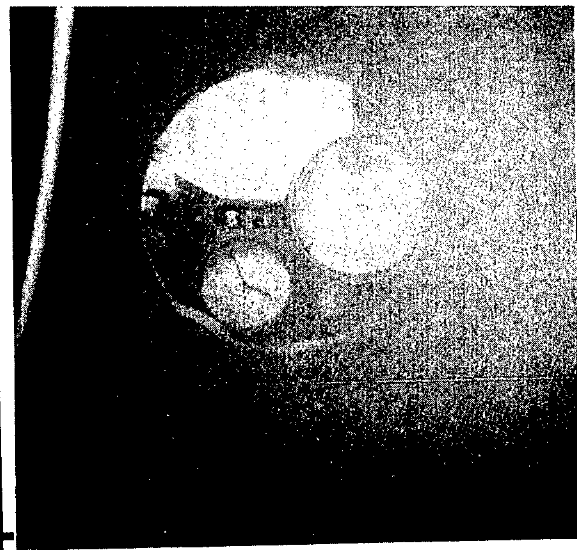

11
4
23
16
24


5
15

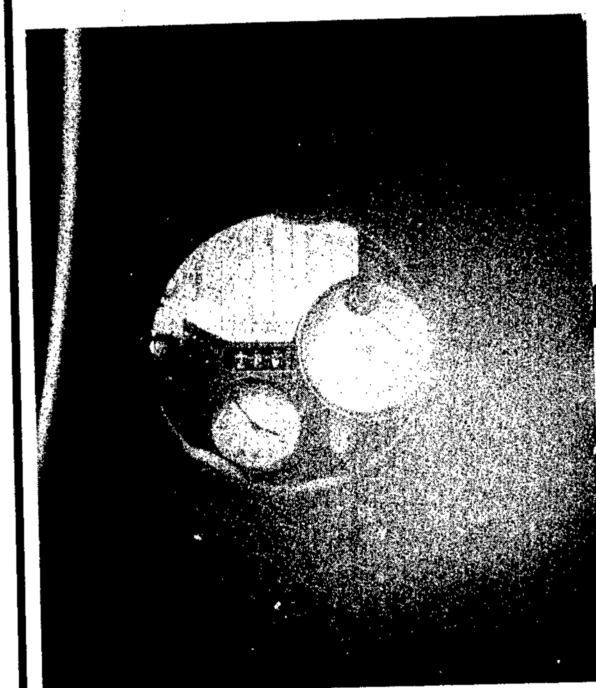


6

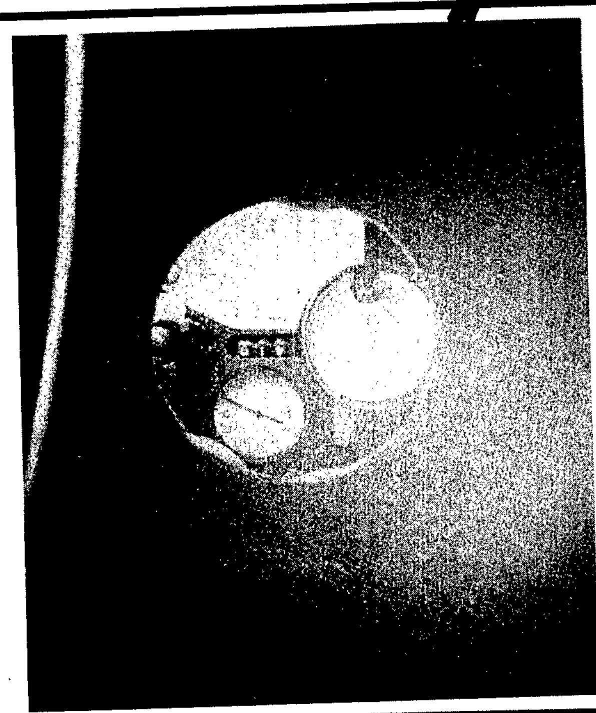




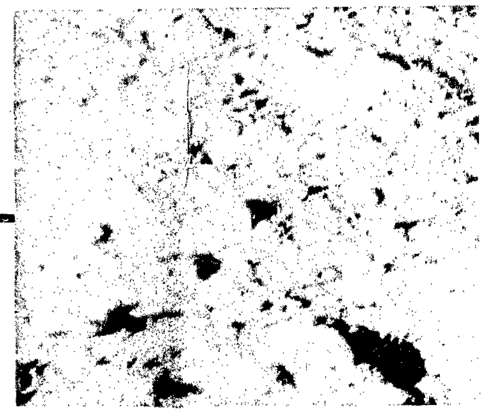
24



15



8



25

14

26

1 13 9

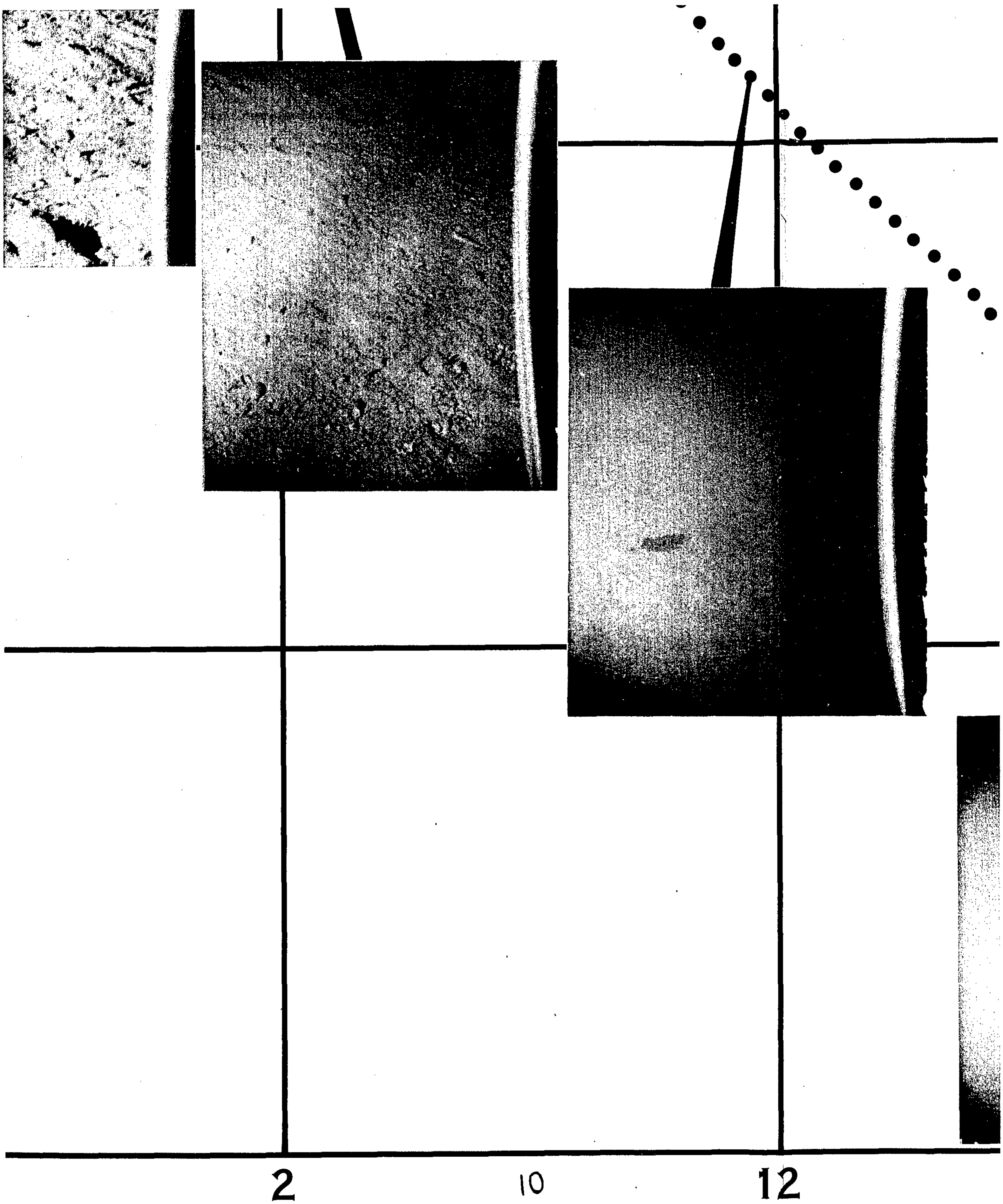
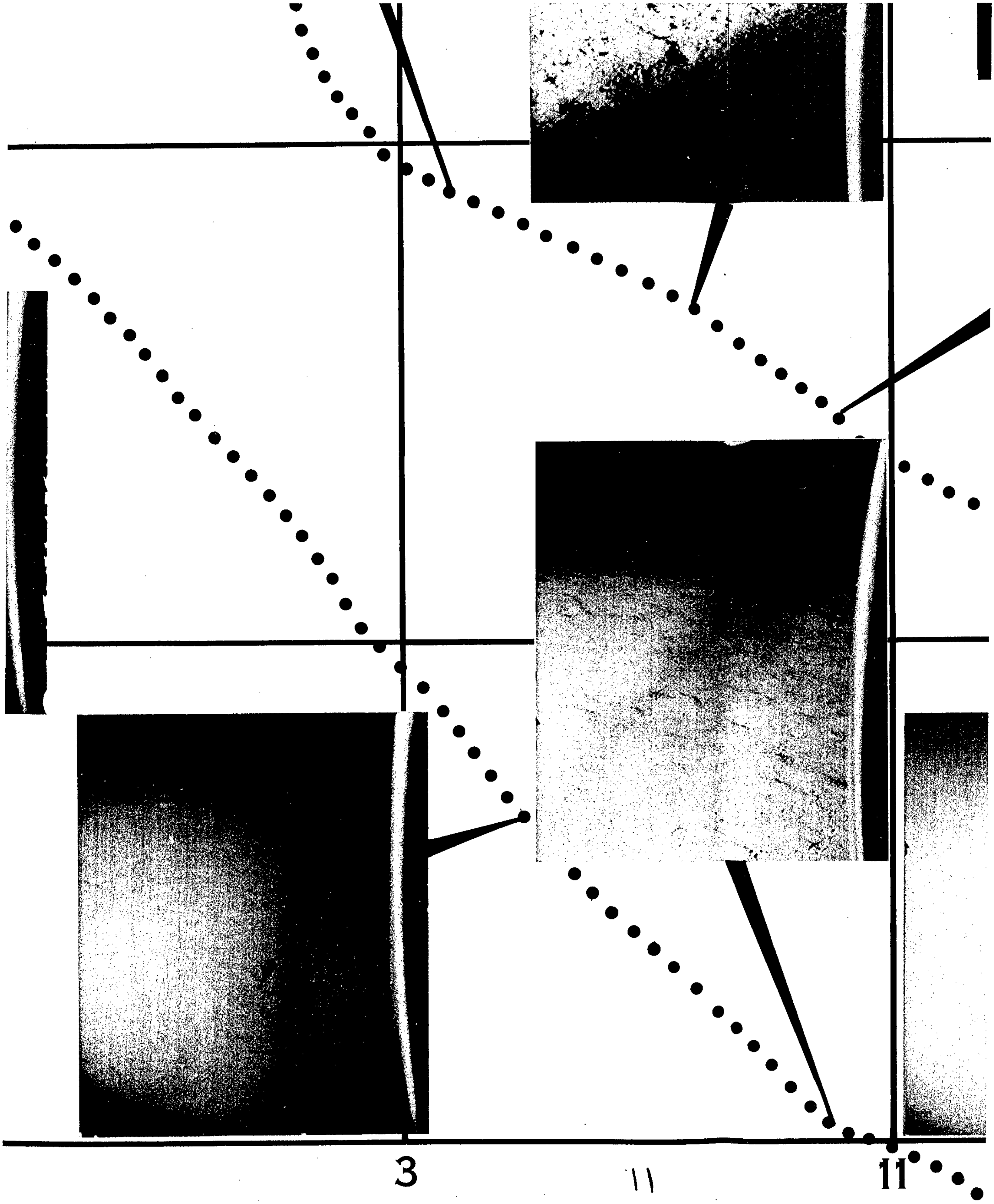
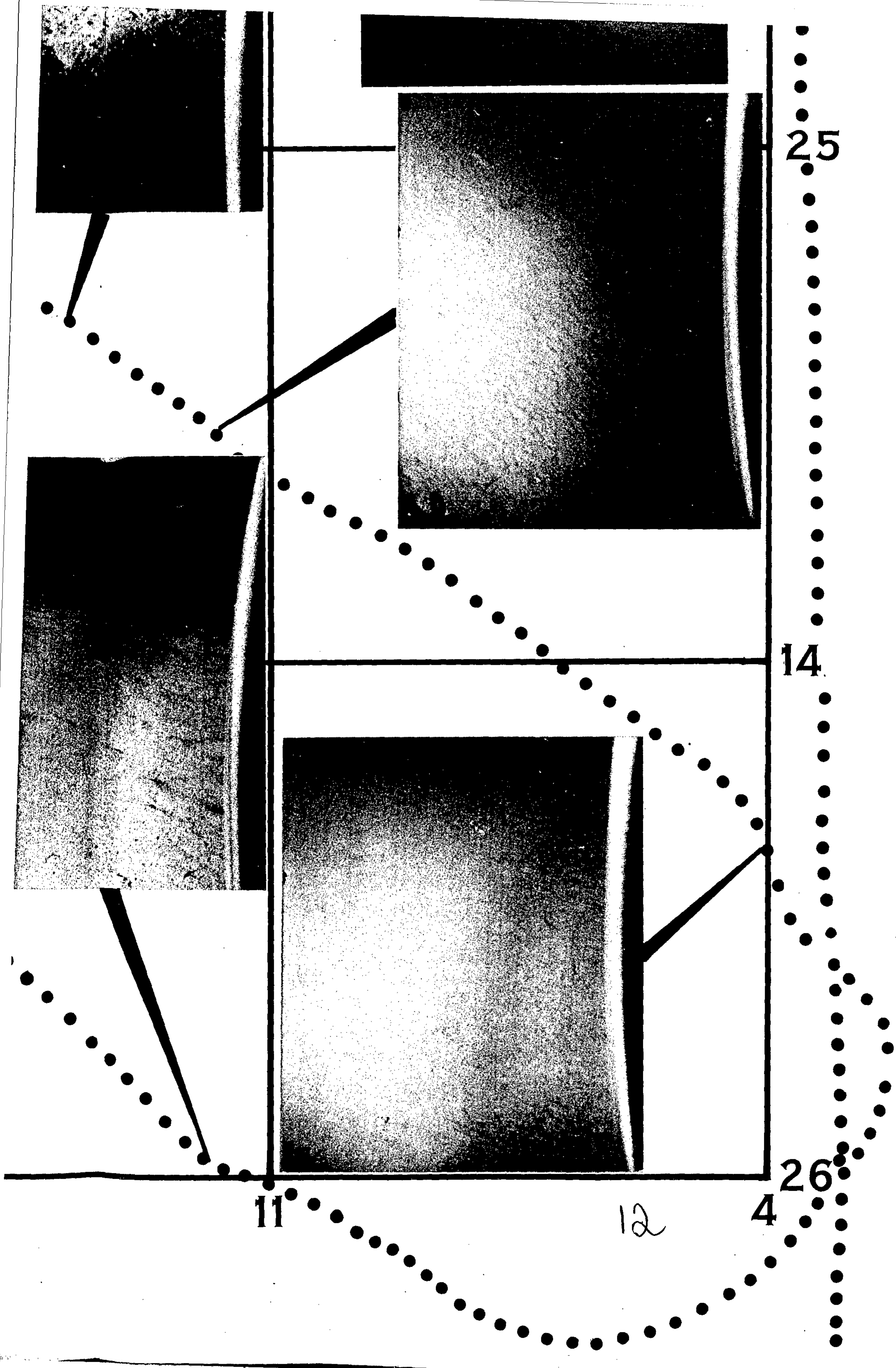


FIGURE 28 SEA LAB III SEA FLOOR



.OOR QUASI PHOTO MOSAIC



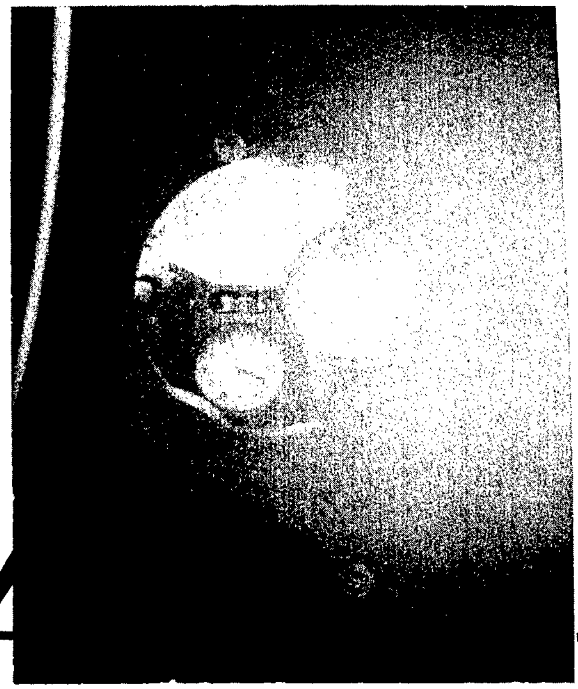
12

1

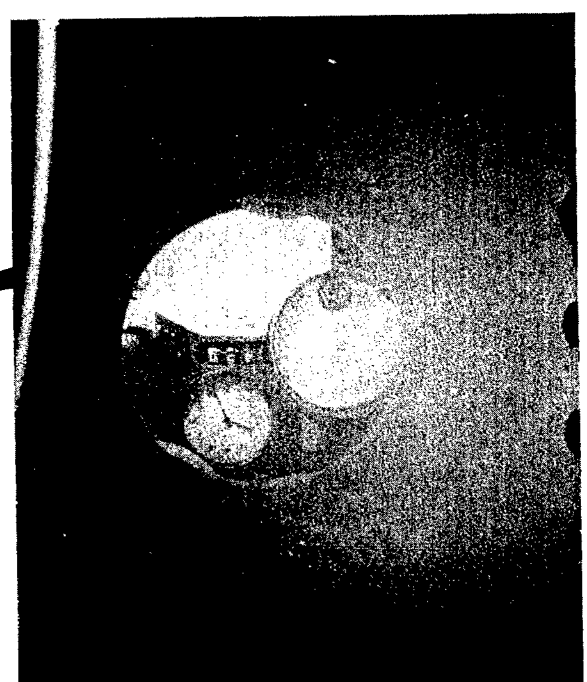
4

10

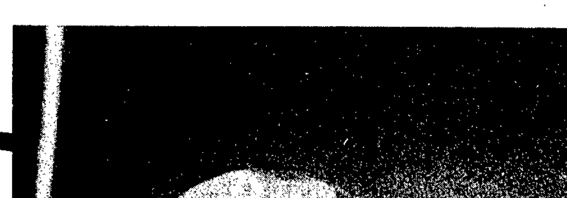
23



16



24



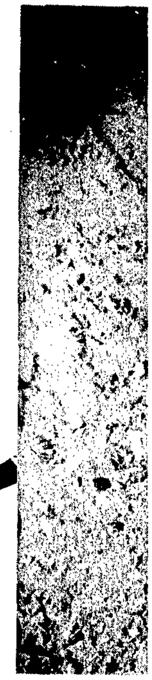
2

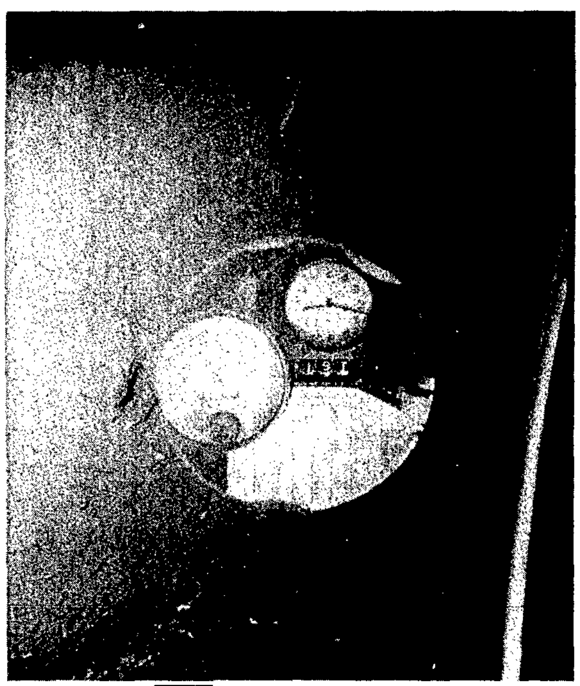
10 5

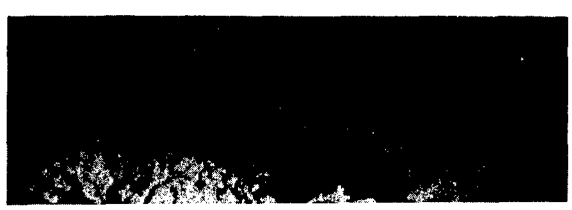
3

9

6







4

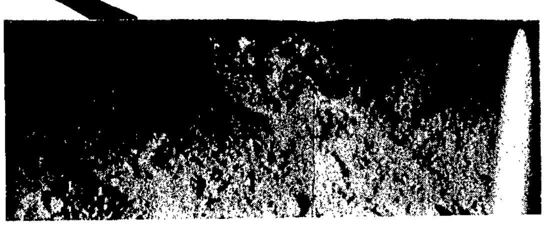
8

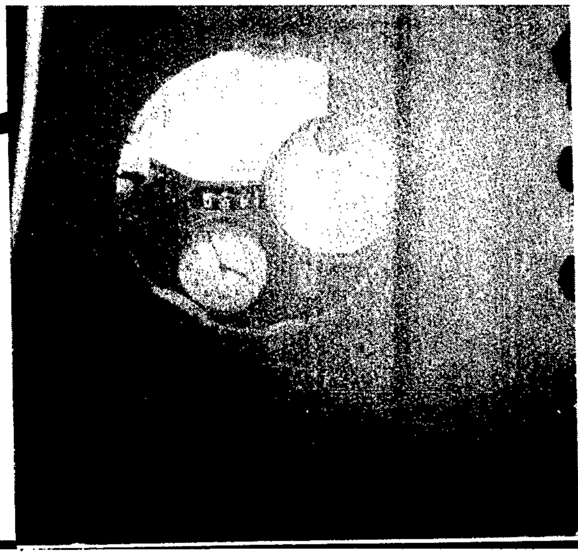
7

23

16

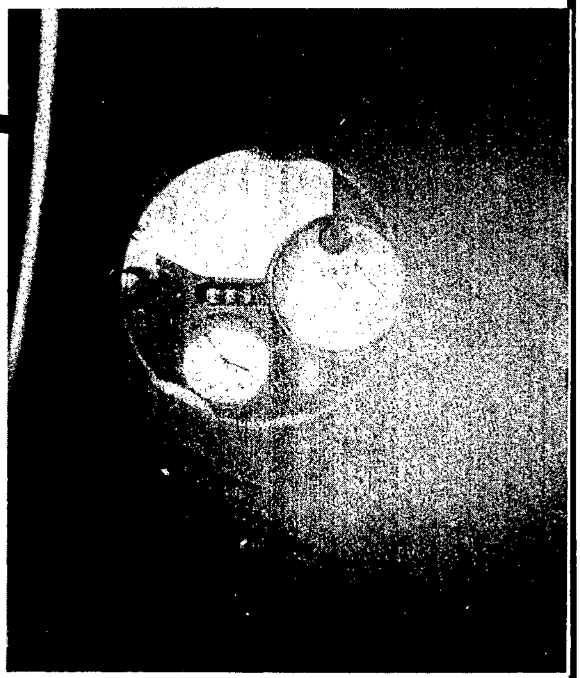
24



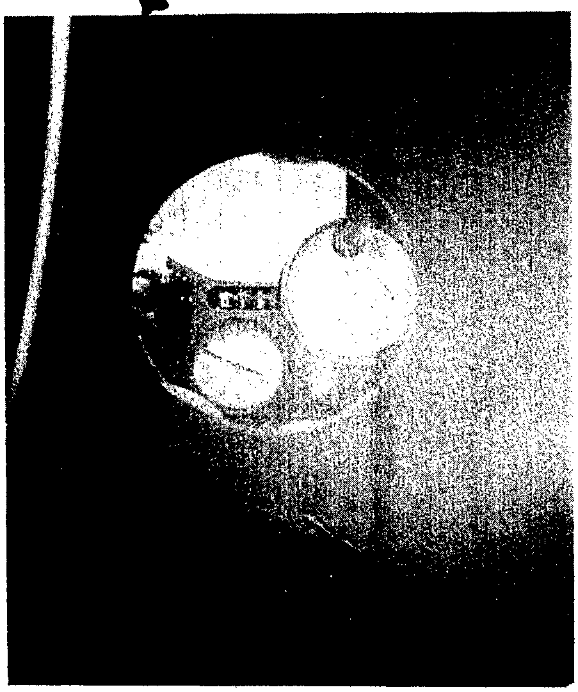


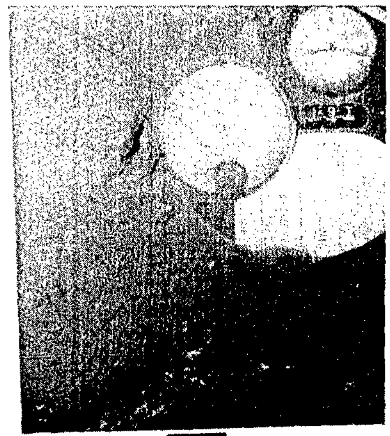
5

24

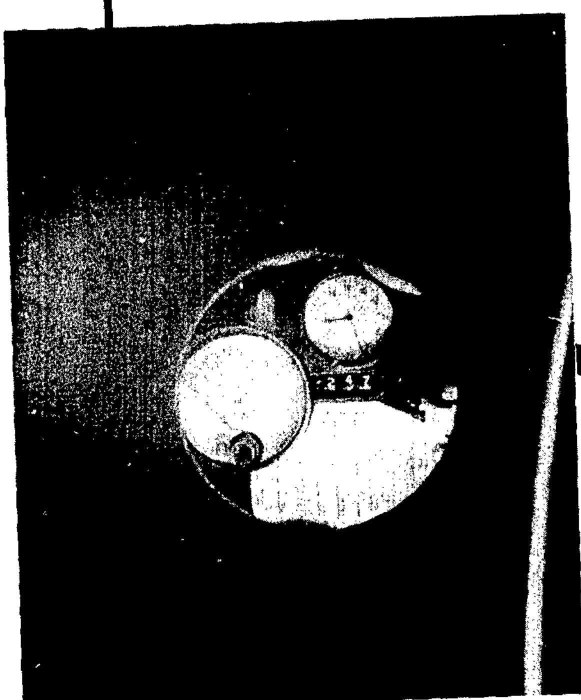


15



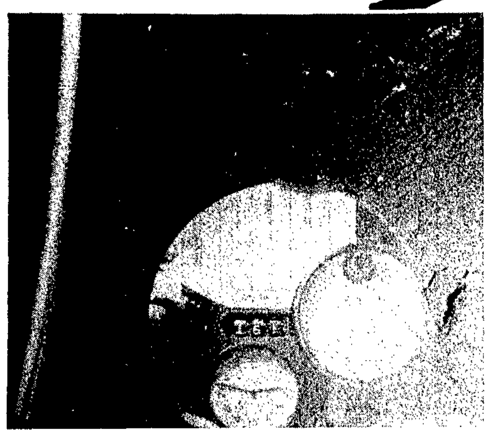


6





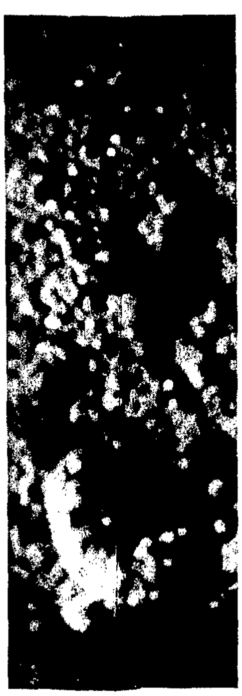
7

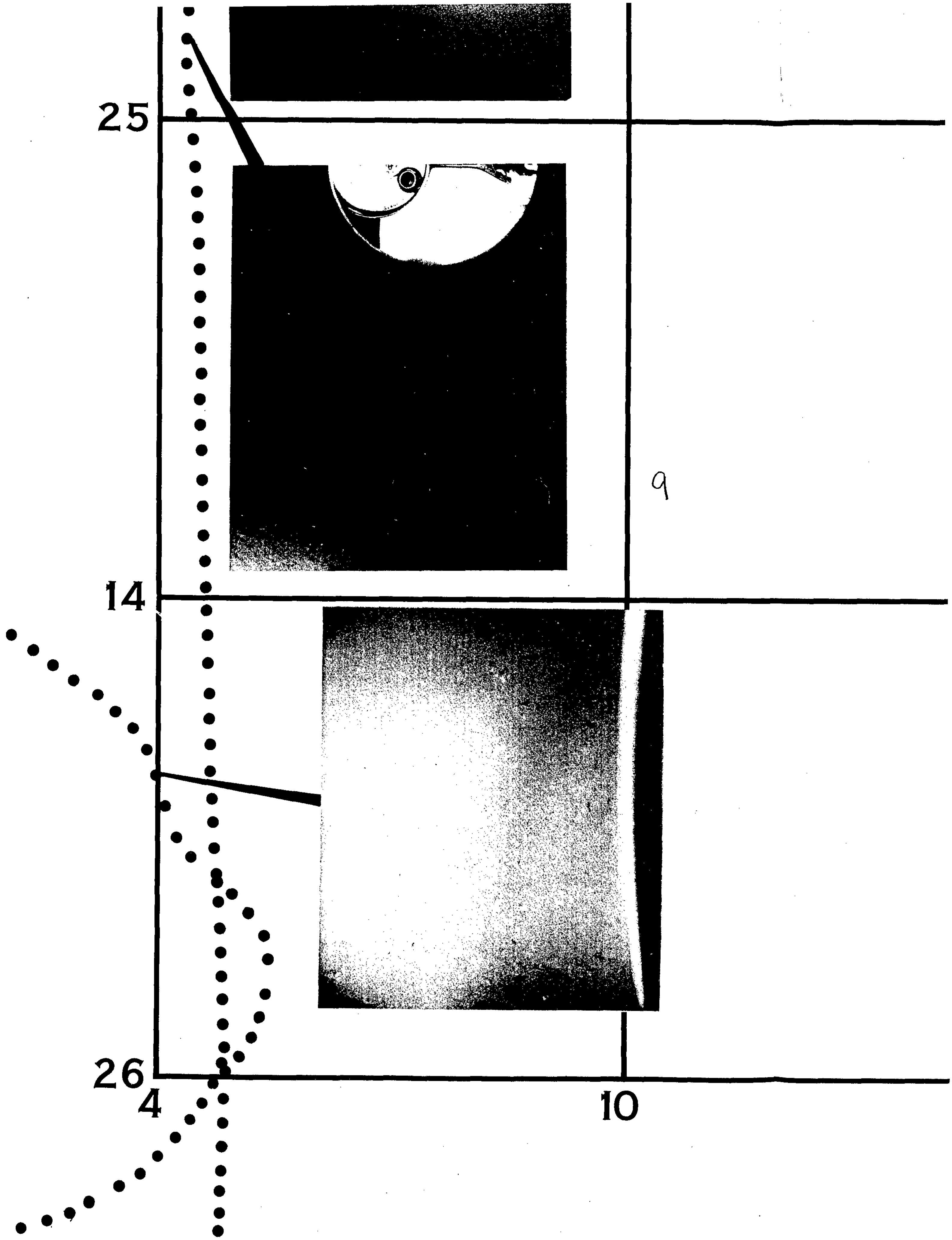



8

24

15





9

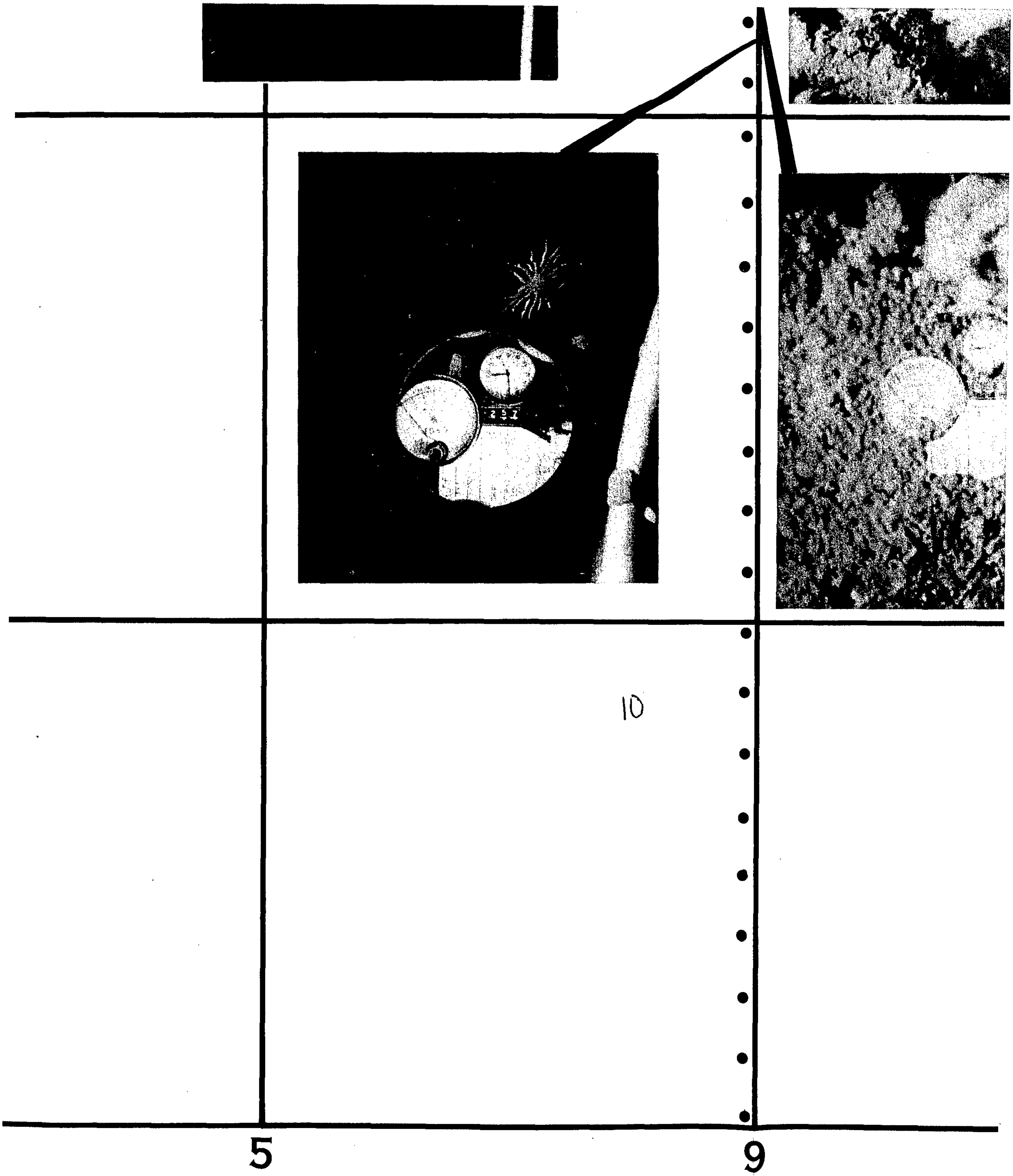
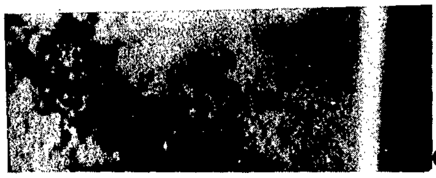
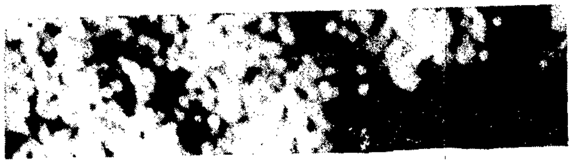


FIGURE 29 SEA LAB III SEA FLOOR G





6

8

OR QUASI PHOTO MOSAIC

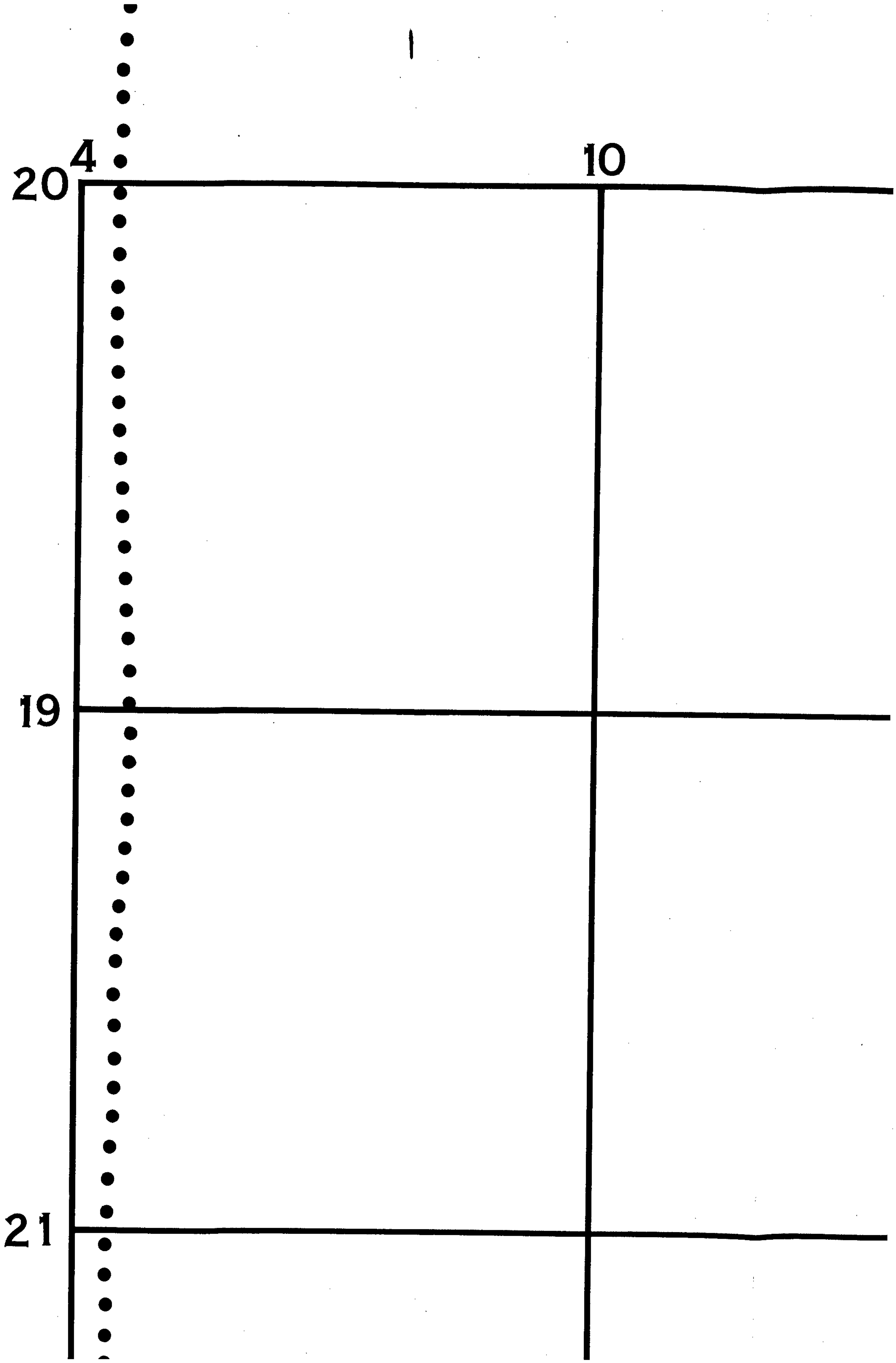
25

14

12

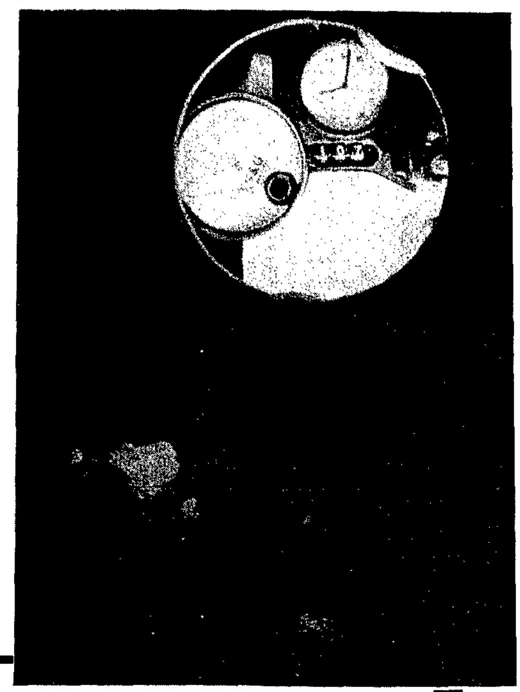
26

8 7

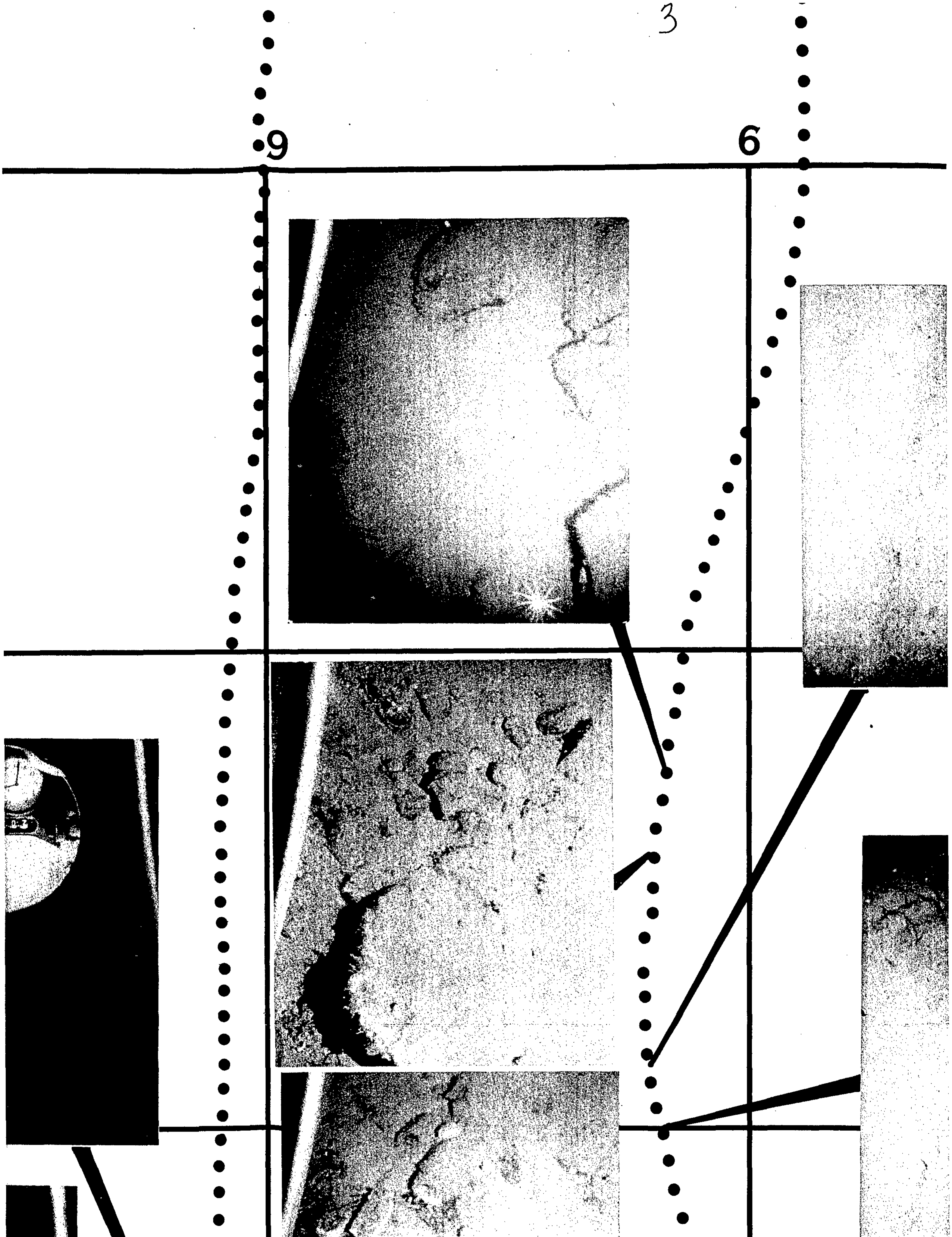

20
4
10
19
21

2

10 5



3



4

8 7 20

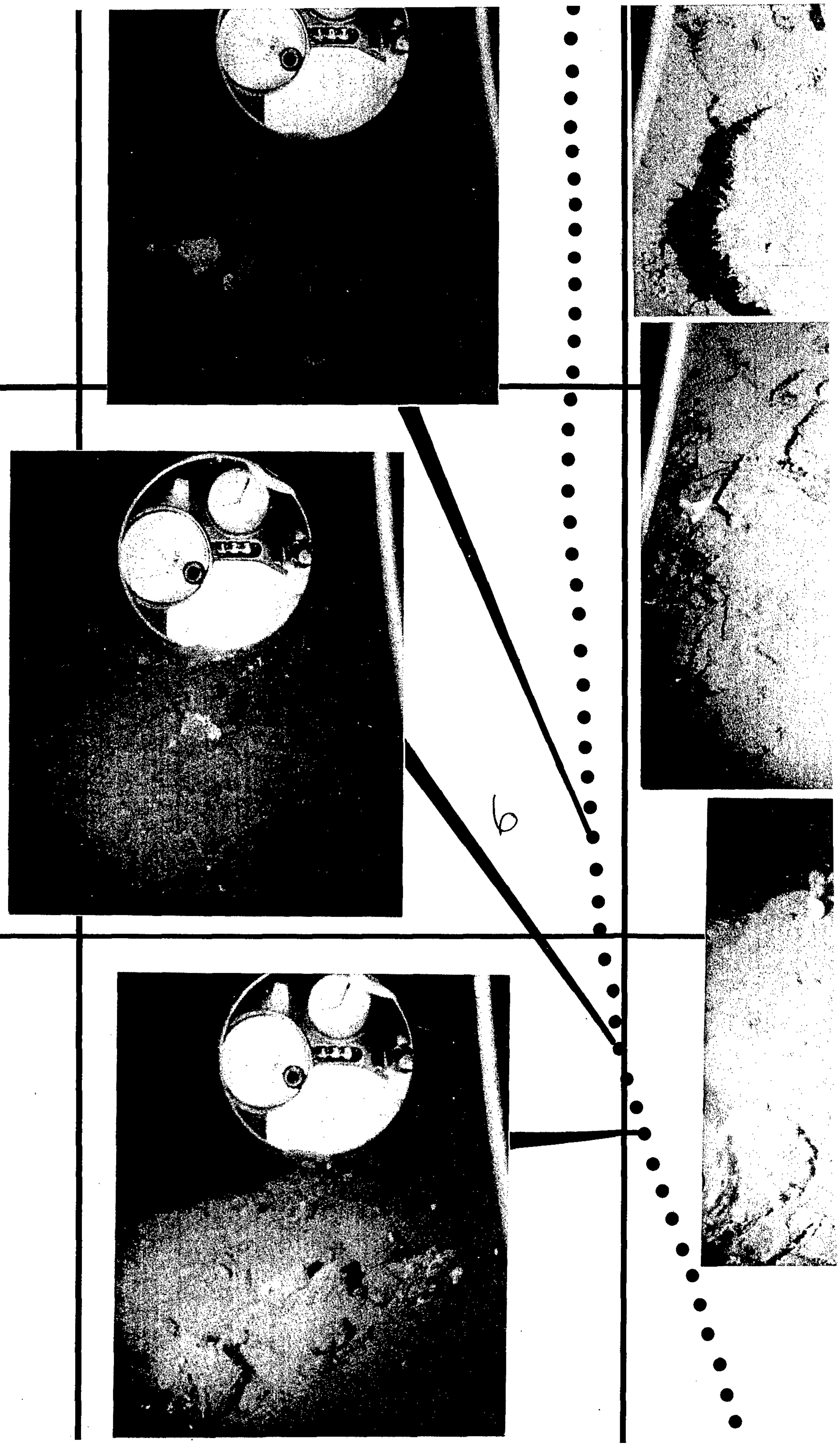
19

21

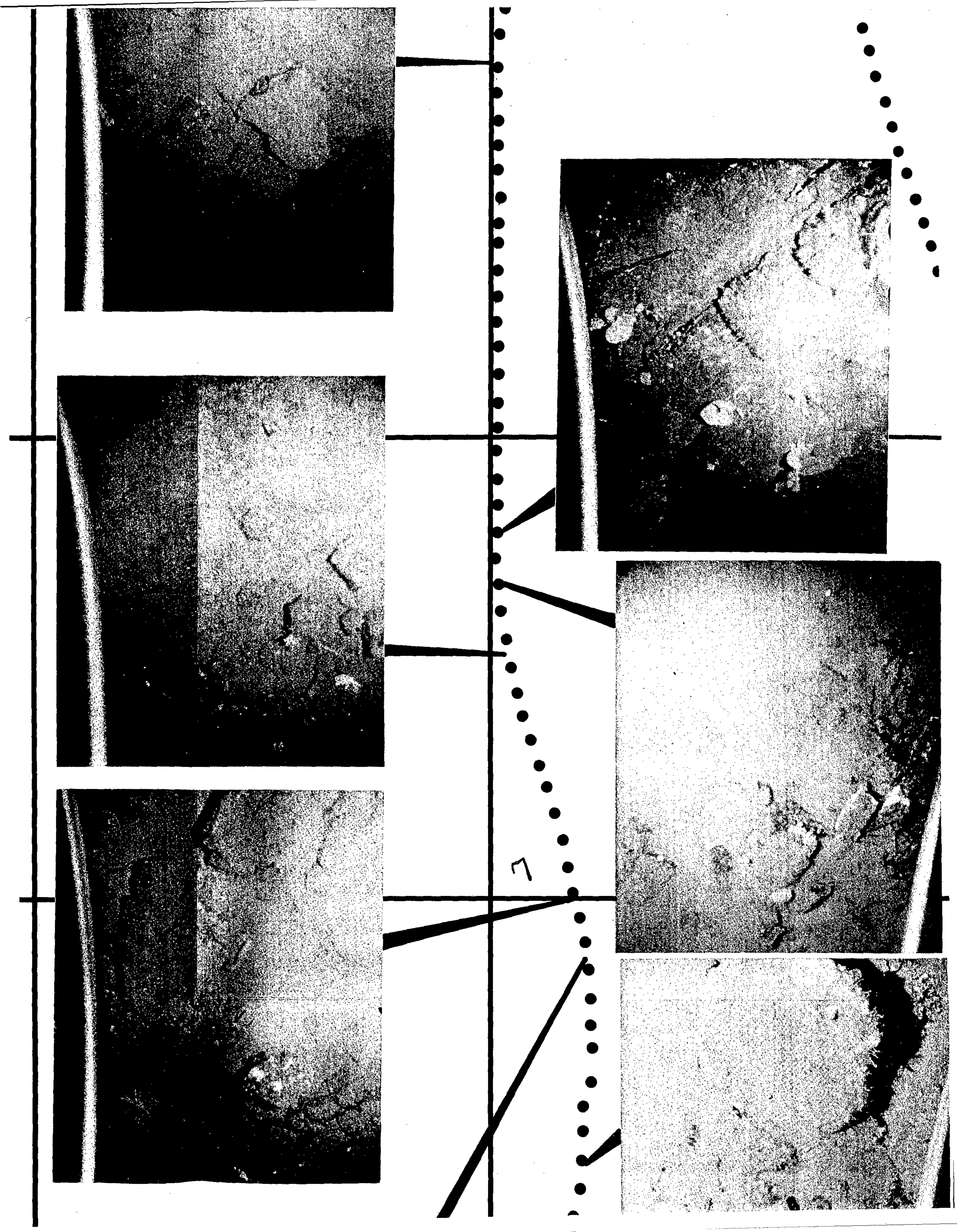
5

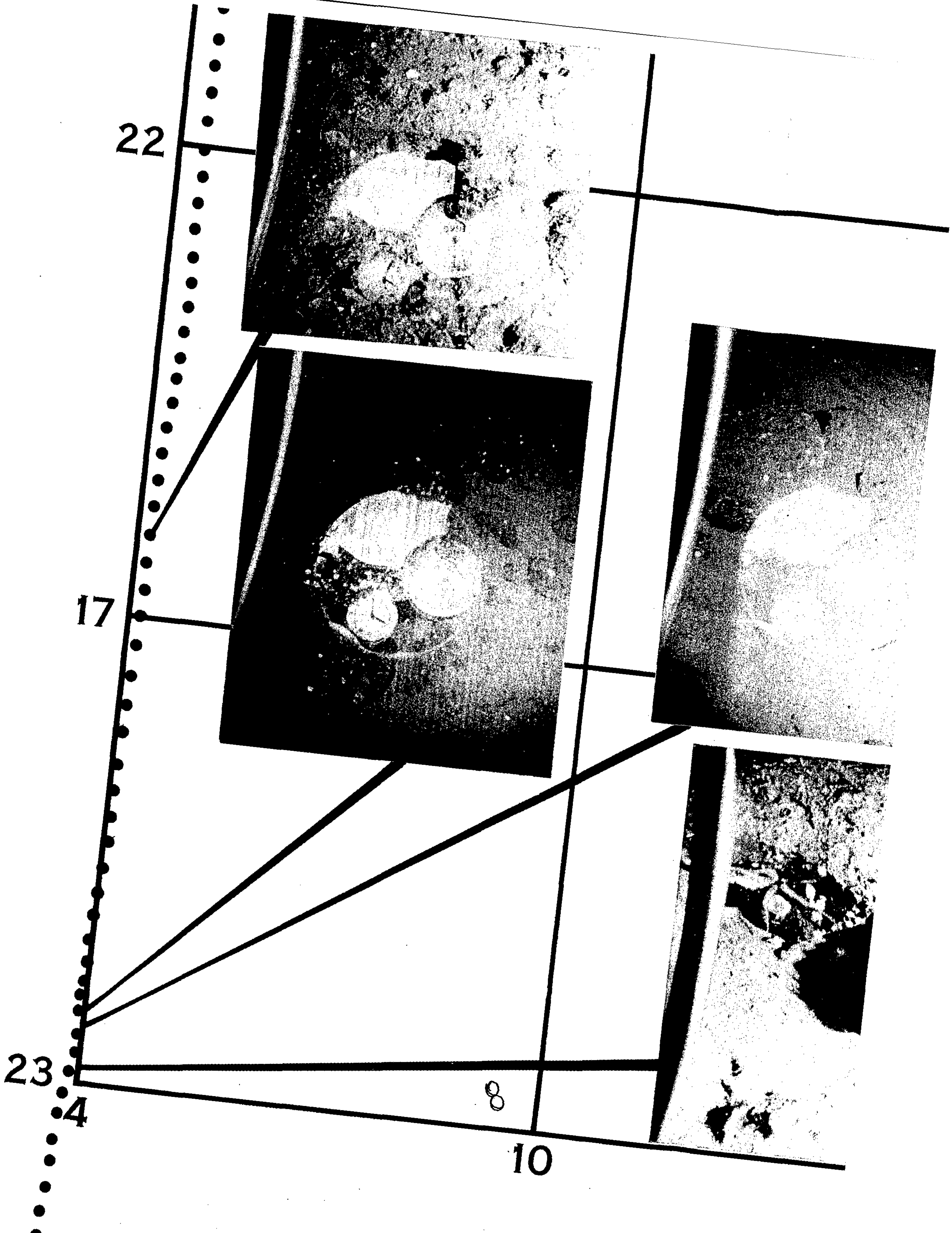
21

18



6




22
17
23
4
8
10

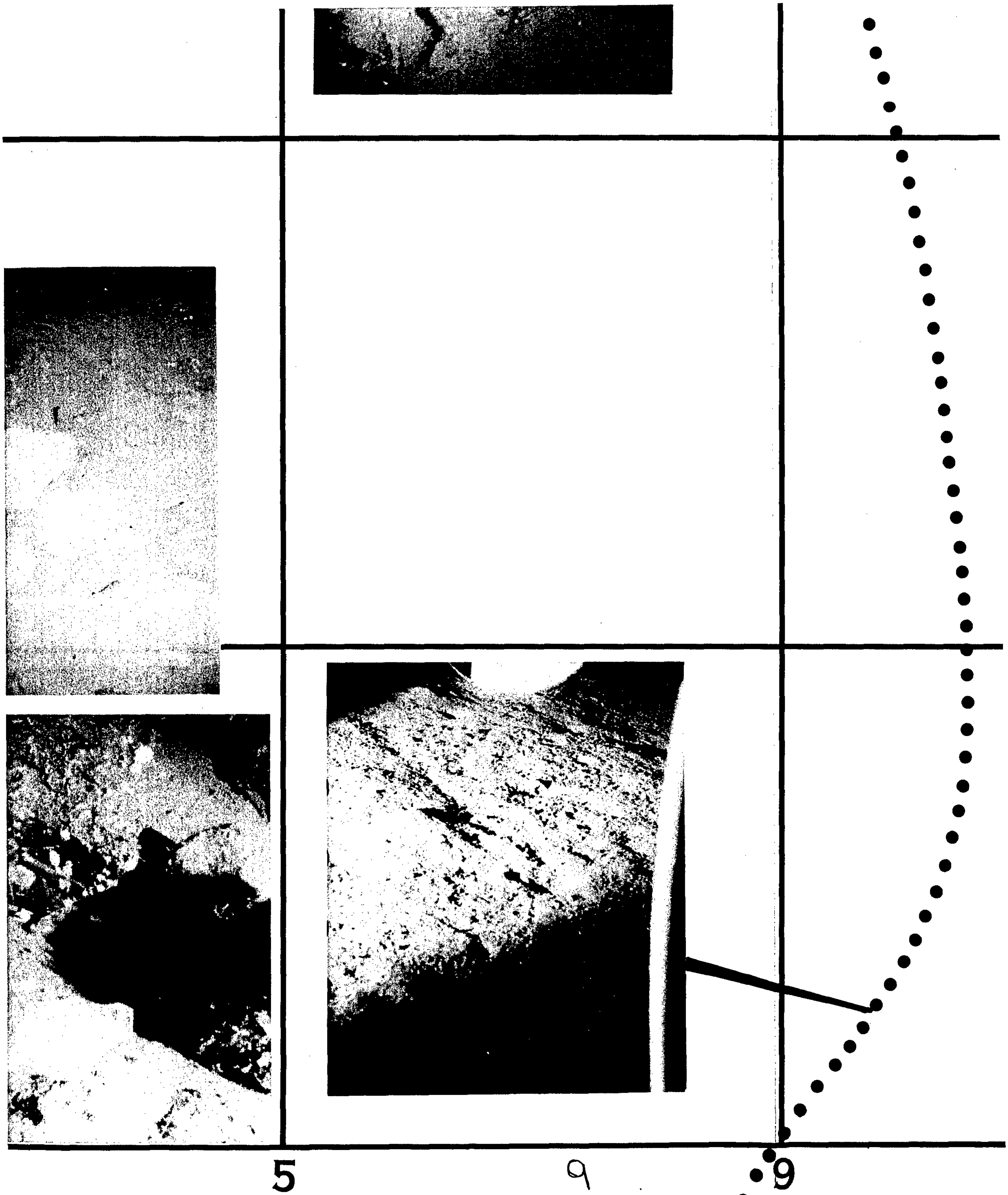
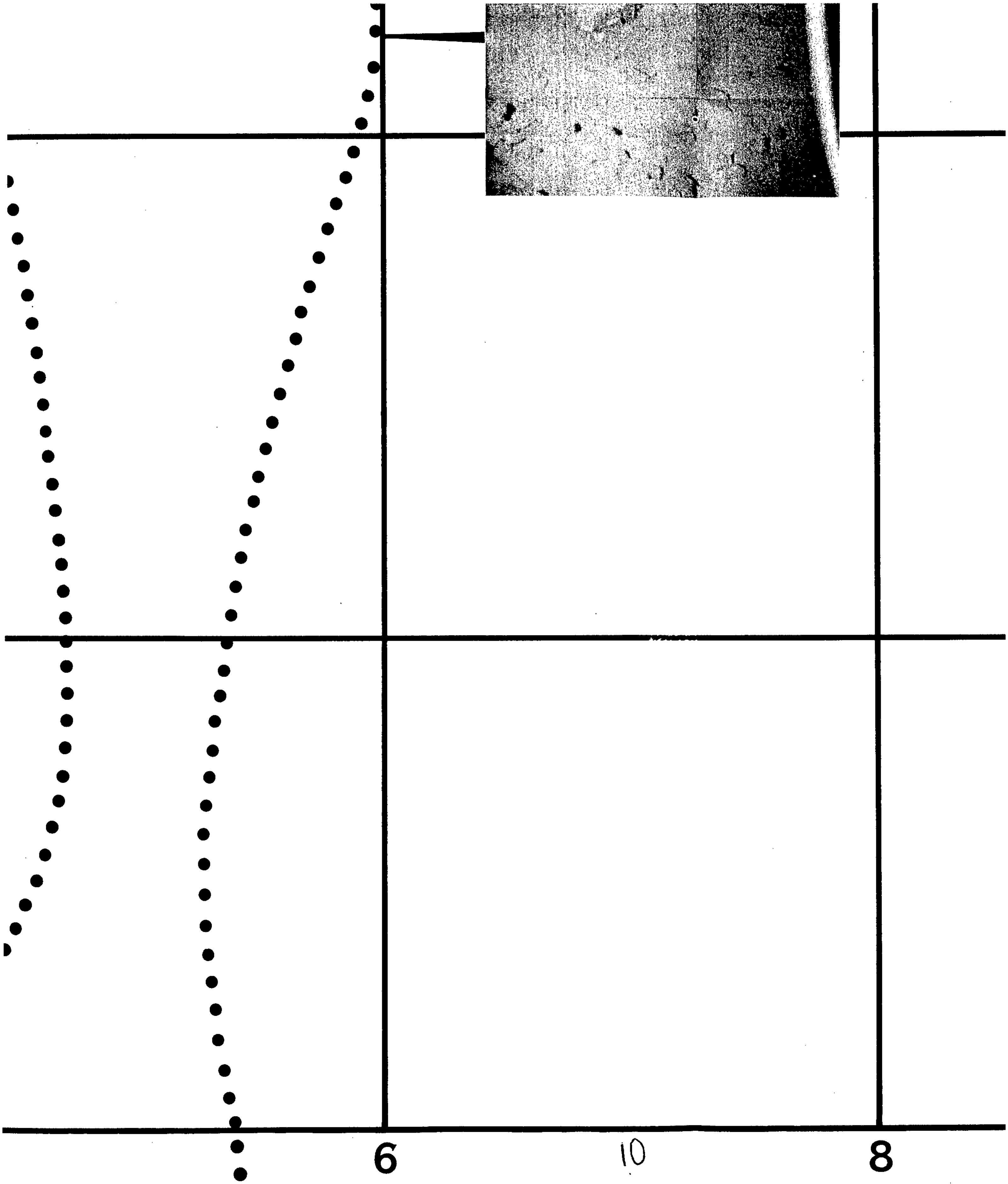
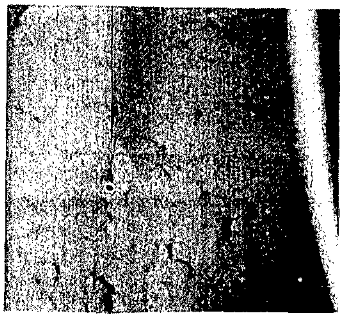


FIGURE 27 SEA LAB III SEA FLOOR QUA



10

QUASI PHOTO MOSAIC



22

17

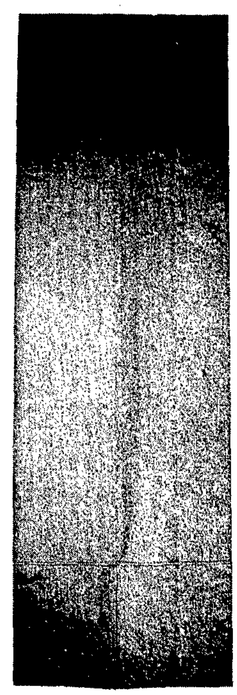
23

8 11 7

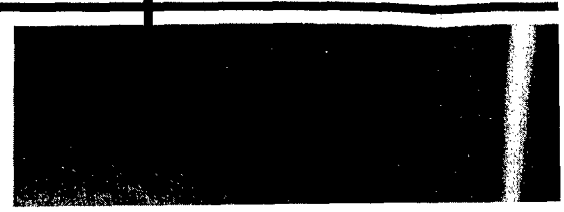
1 13

20

19

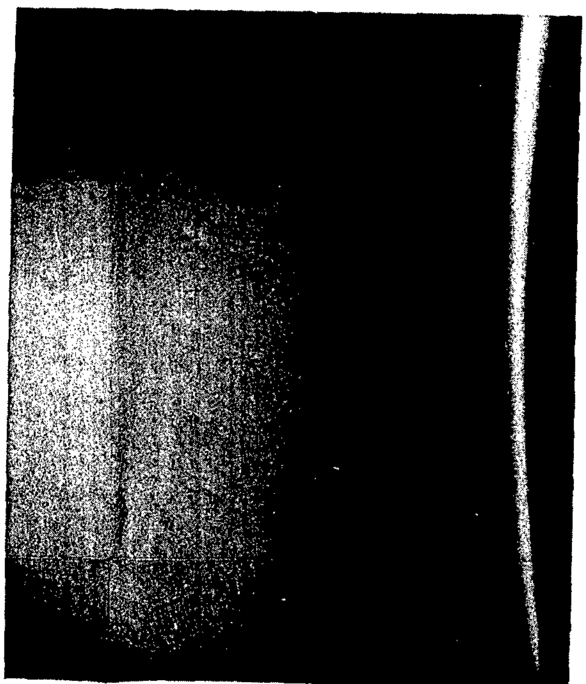


21

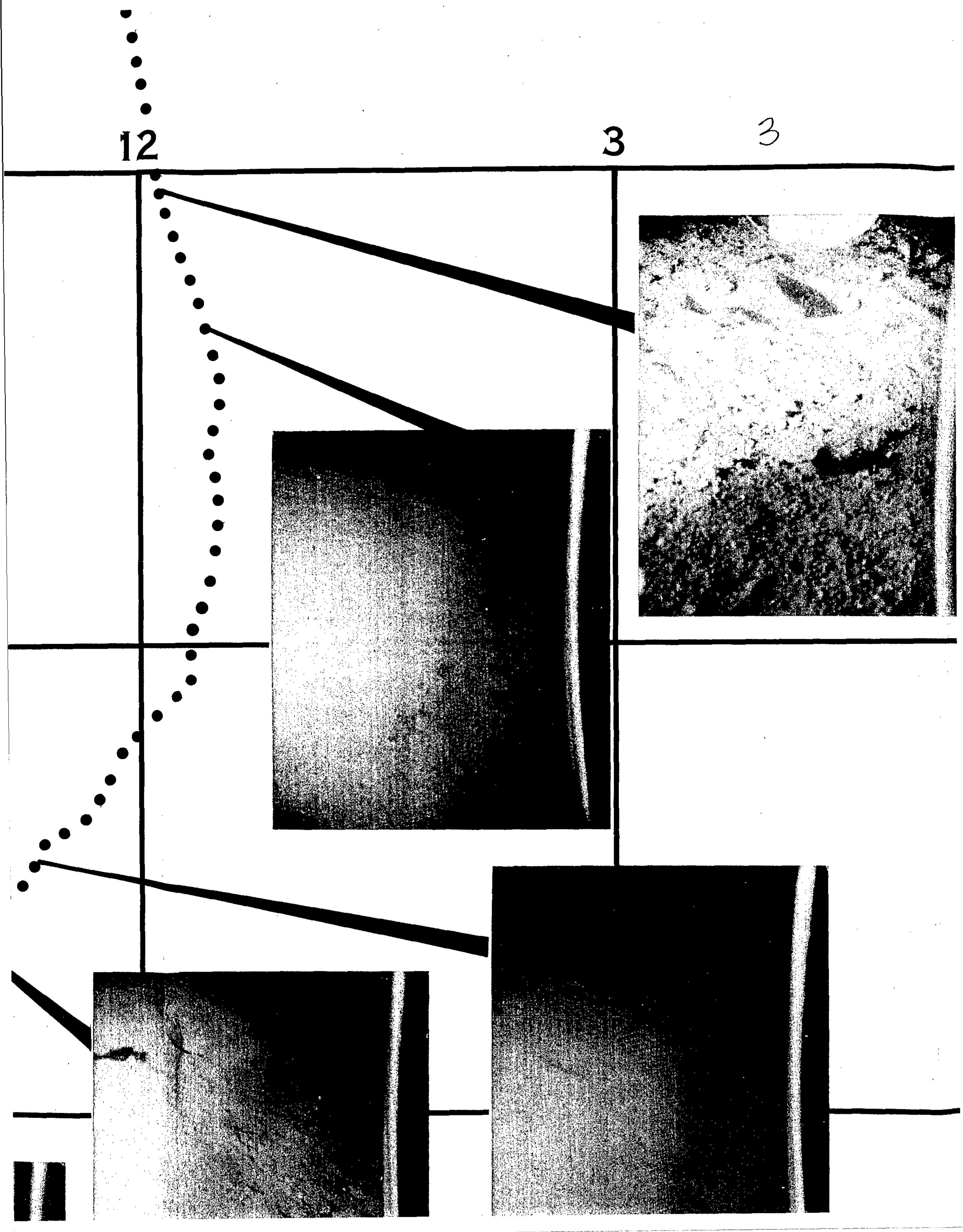


2

13 2



3



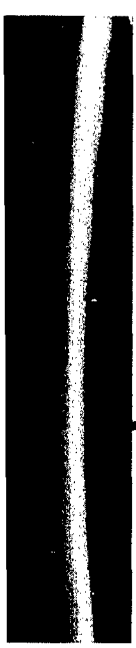
11

4

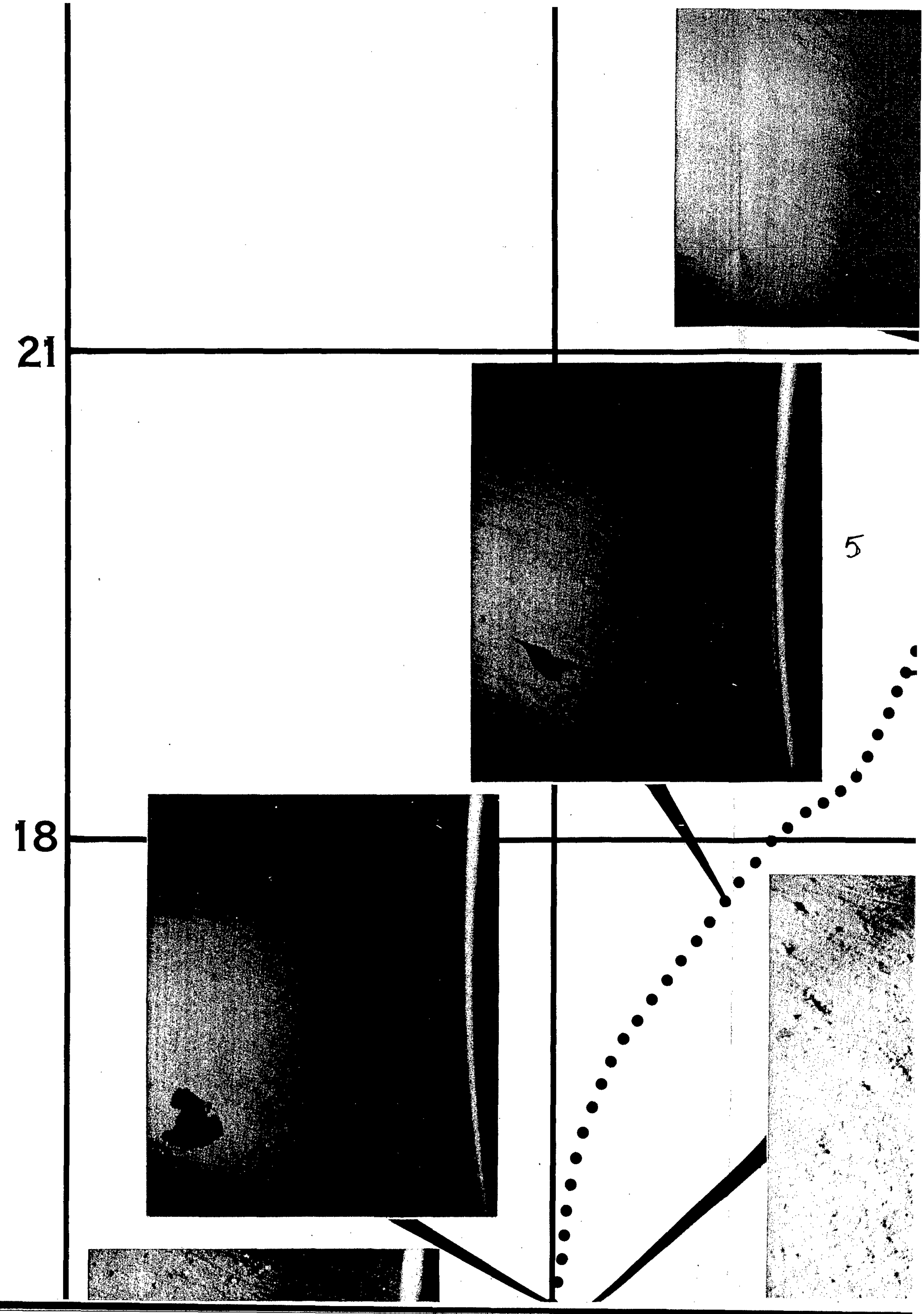
4

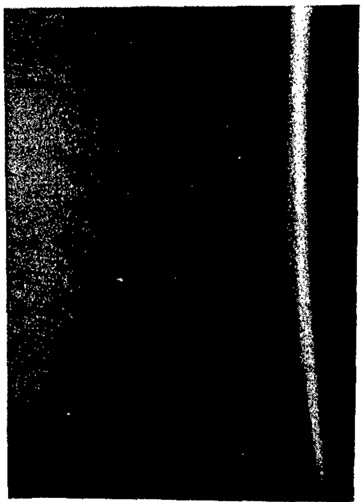
20

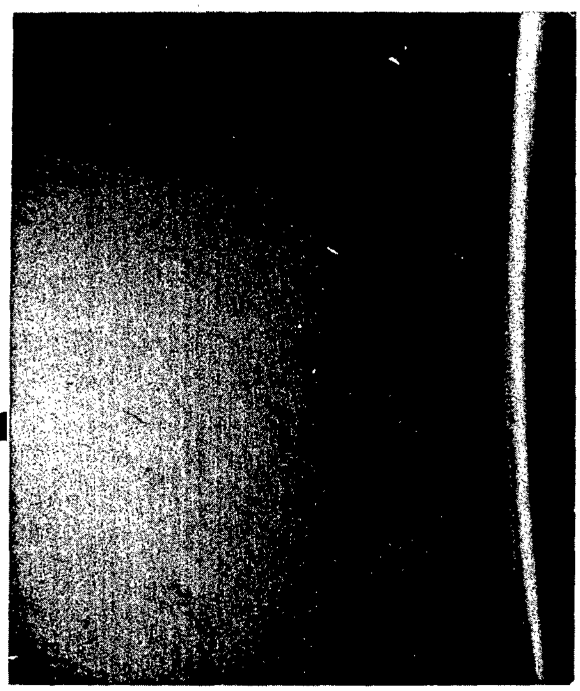
19



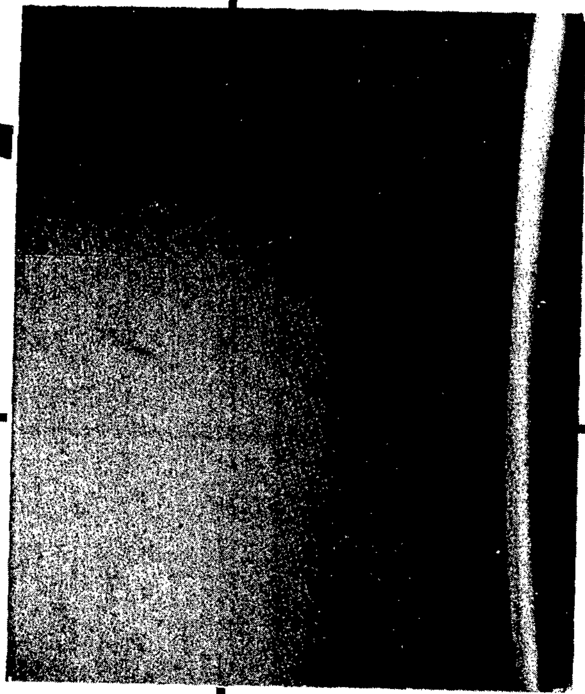
21


21
18
5





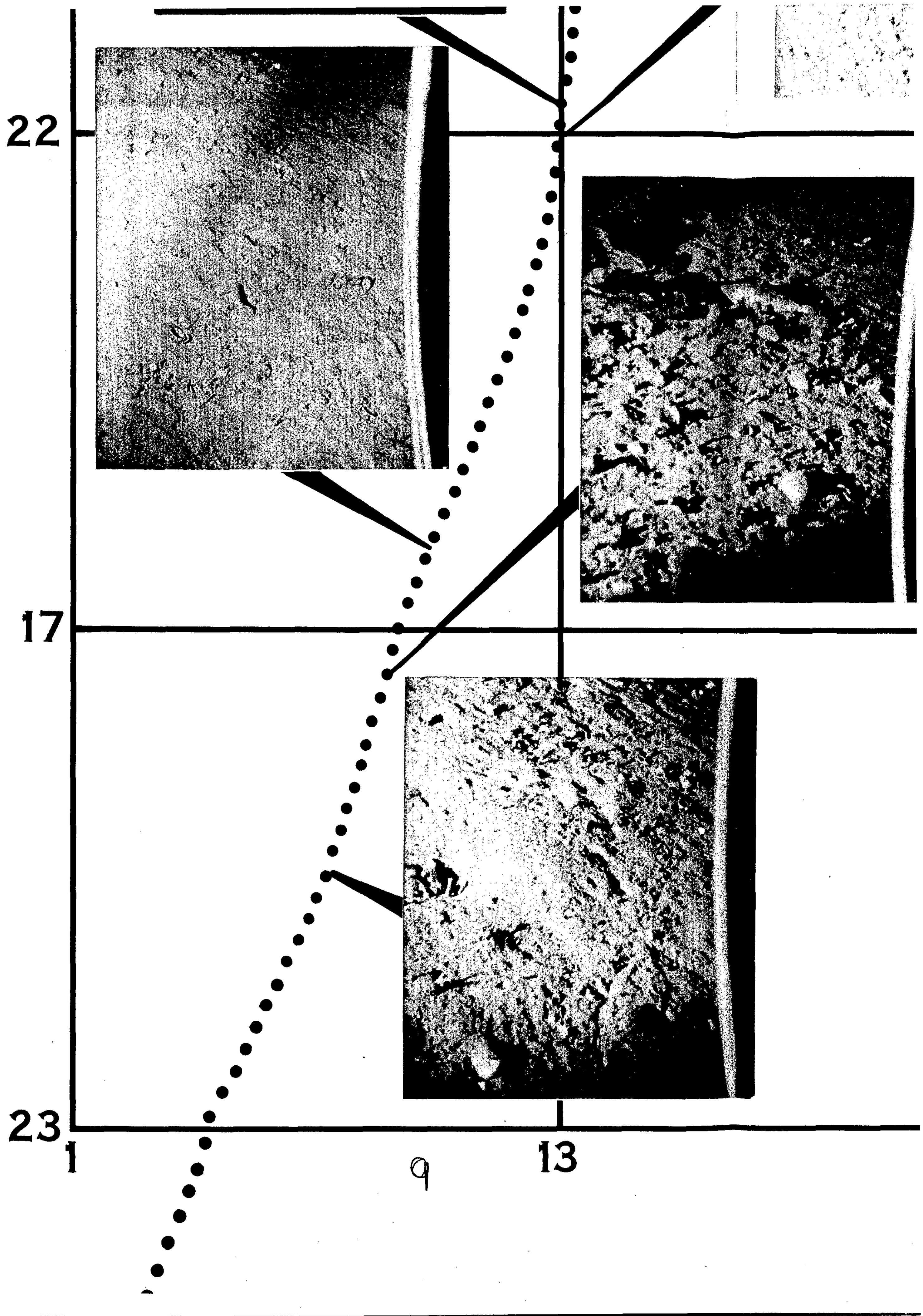
6

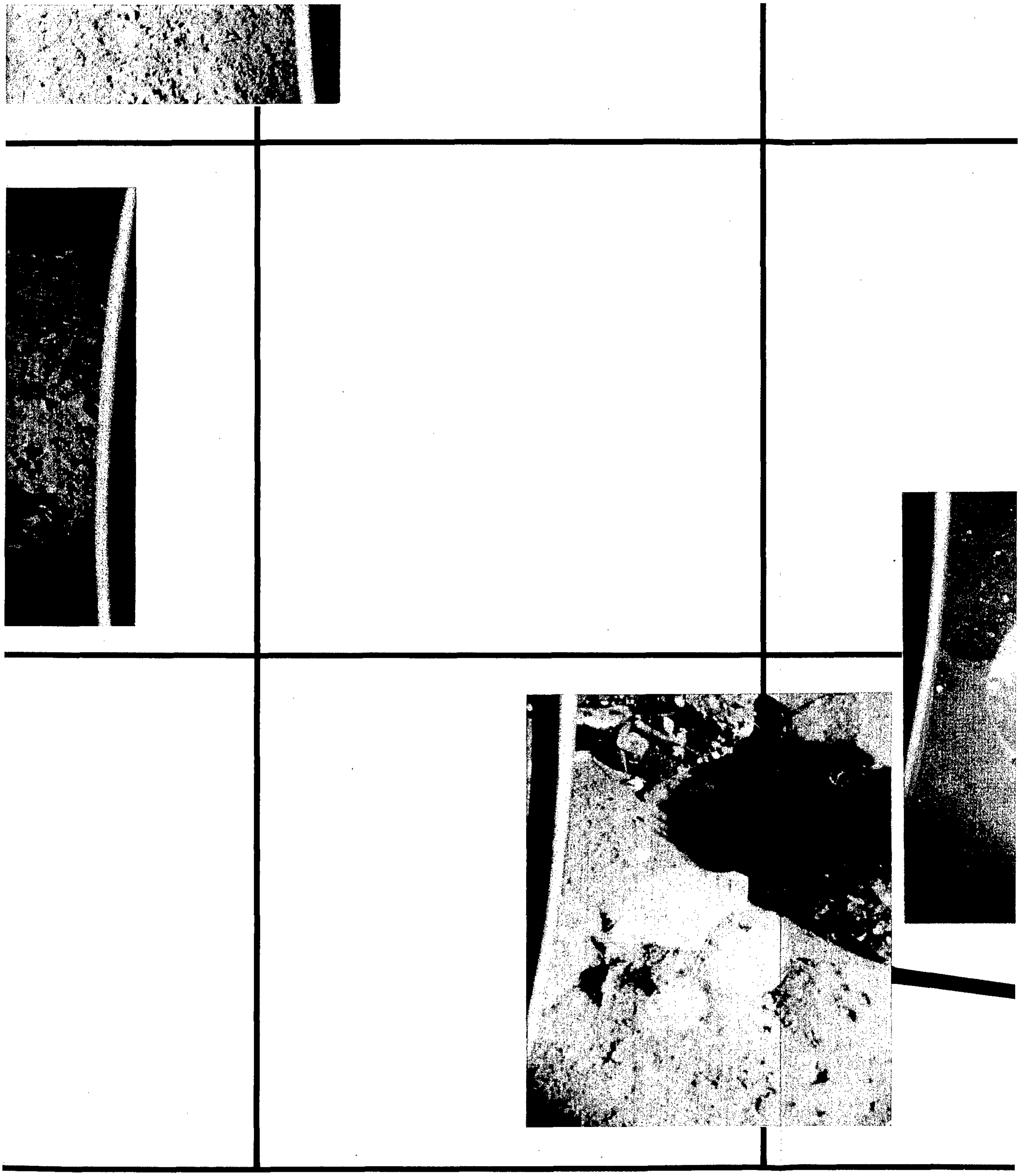


21

18

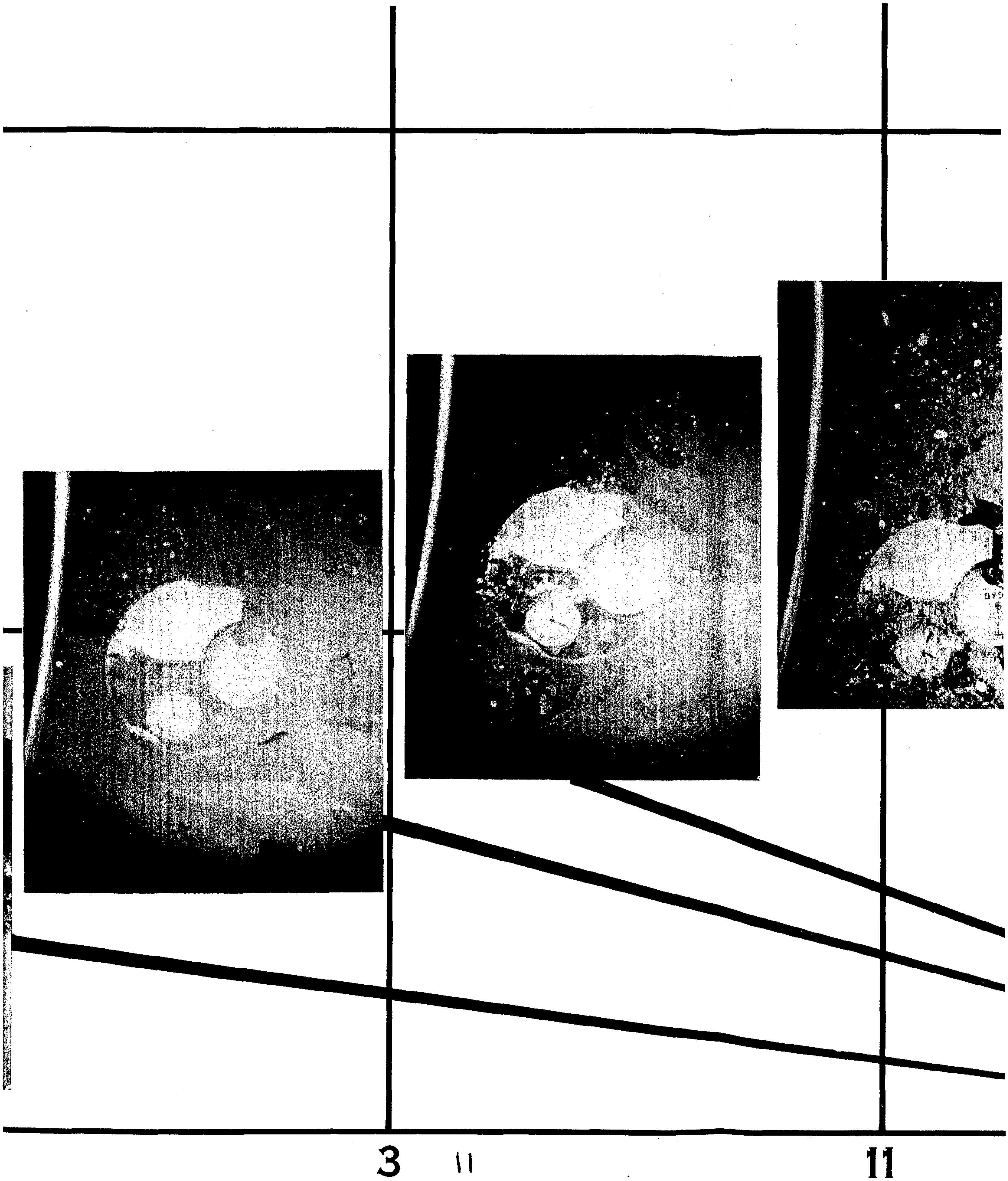
8


22
17
23
1
9
13



10

FIGURE 26 SEA LAB III SEA FLOOR QU



OR QUASI PHOTO MOSAIC

22

17

23

4

11

12